UNCLASSIFIED

AD NUMBER AD465552 NEW LIMITATION CHANGE TO Approved for public release, distribution unlimited **FROM** Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative and Operational Use; Apr 1965. Other requests shall be referred to the Army Biological Laboratories, Attn: Technical Releases Branch, Fort Detrick, MD 21701. **AUTHORITY** CFSTI, per Ft Detrick memo, dtd 29 Jul 1965

AMERICAN INSTITUTE OF CROP ECOLOGY Silver Spring, Maryland

THE USE OF PHENOLOGY IN ASCERTAINING THE TEMPERATURE REQUIREMENTS OF WHEAT

WITH SPECIAL REFERENCE TO

THE WHEAT OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

AND ITS LATITUDINAL AND THERMAL ANALOGUES IN OTHER COUNTRIES

(Tabular Material - Part I)

Based on Data of the Northern Great Plains Region of the United States and Its Latitudinal and Thermal Analogues in Other Countries

Contract No. DA 18-064-AMC-127(A)



NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

AMERICAN INSTITUTE OF CROP ECOLOGY Silver Spring, Maryland

THE USE OF PHENOLOGY IN ASCERTAINING THE TEMPERATURE REQUIREMENTS OF WHEAT WITH SPECIAL REFERENCE TO

THE WHEAT OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES AND ITS LATITUDINAL AND THERMAL ANALOGUES IN OTHER COUNTRIES

(Tabular Material - Part I)

Based on Data of the Northern Great Plains Region of the United States and Its Latitudinal and Thermal Analogues in Other Countries

Contract No. DA 18-064-AMC-127(A)

April, 1965

DDC AVAILABILITY NOTICE

- (a) Qualified requestors may obtain copies of this document from DDC.
- (b) Foreign announcement and dissemination of this document by DDC is limited.
- (c) The information in this document has not been cleared for release to the public.

LIST OF TABLES

TABLES

- Global Climatic Analogues for the Spring-Crop Season in the Northern Great Plains Region of the United States.
- 2 Global Thermal Analogues for the Spring-Crop Season in the Northern Great Plains Region of the United States.
- 3 Year-Round Global Climatic Analogues of the Northern Great Plains Region of the United States.
- Year-Round Global Thermal Analogues of the Northern Great Plains Region of the United States.

Winter Wheats of the Northern Great Plains Region of the United States.

Phenology and Day-Degree Summations of <u>Kharkof Variety</u> Grown at the Following Agricultural Experiment Stations:

- 5 Havre, Montana
- 6 Moccasin, Montana
- 7 Sheridan, Wyoming
- 8 Alliance, Nebraska
- 9 North Platte, Nebraska
- 10 Lincoln, Nebraska
- Variation in the Mean Day-Degree Summations Required for Heading and Ripening of Kharkof Variety at Different Latitudes.

Spring Wheats of the Northern Great Plains Region of the United States.

Phenology and Day-Degree Summations of Thatcher Variety
Grown at the Following Agricultural Experiment Stations:

- 12 Langdon, North Dakota
- 13 Havre, Montana
- 14 Williston, North Dakota
- 15 Moccasin, Montana
- 16 Fargo, North Dakota
- 17 Dickinson, North Dakota
- 18 Mandan, North Dakota
- 19 Sheridan, Wyoming
- 20 Newell, South Dakota
- 21 Brookings, South Dakota
- 22 Alliance, Nebraska
- 23 North Platte, Nebraska
- Variation in the Mean Day-Degree Summations Required for Heading and Ripening of Thatcher Variety at Different Latitudes.

	Phenology and Day-Degree Summations for Winter Wheat Grown at the
	Following Localities in the Ukraine SSR, USSR:
25	Voznyesyensk, Nikolayev Oblast(OD 3 Variety)
26	Ternopil, Ternopil Oblast(Yeritrospyermum 15 Variety)
26	Borshchiv, Ternopil Oblast(Yeritrospyermum Variety)
26	Bila Krinitsya, Ternopil Oblast(Local Variety)
27	Mironovka, Kiev Oblast(Local Variety)
28	Verkhnyachka, Kiev Oblast(Local Variety)
	Phenology and Day-Degree Summations for Winter Wheat Grown at the
	Following Localities in North Caucasus, USSR:
29	Prokhladnaya, Kabardino-Balkarskoy ASSR(Krasnodarka Variety)
29	Basjan, Kabardino-Balkarskoy ASSR(Novoukrainka 83 Variety)
29	Nalchik, Kabardino-Balkarskoy ASSR (Novoukrainka 83 Variety)
30	Average Phenology and Day-Degree Summations for Winter Wheat (Local
	Variety) Grown at Morshansk, Tambov Oblast, RSFSR, USSR.
	Phenology and Day-Degree Summations for Spring Wheat Grown at the
	Following Localities in the Ukraine SSR, USSR:
31	Kolmiya, Stanislavskiy Oblast(Local and Lutyestsyens 62 Varieties)
32	Bila Krinitsya, Ternopil Oblast (Local Variety)
33	Bashtanka, Nikolayev Oblast(Lutyestsyens Variety)
34	Bashtanka, Nikolayev Oblast (Melyanopus 3/ and Melyanopus 69 Varieties
34	Voznyesyensk, Nikolayev Oblast (Melyanopus 69 Variety)
35	Dolina, Stanislavskiy Oblast (Local and Lutyestsyens 62 Varieties)
J J	bolina, beautolavokly oblabe - (bocal and bucyesenyens of vallettes)
36	Average Phenology and Day-Degree Summations for Spring Wheat
	(Lutyestsyens 62 Variety) Grown at Gryazi, Lipetsk Oblast, RSFSR, USSR.
	Phenology and Day-Degree Summations for Spring Wheat (Local Varieties)
	Grown at the Following Localities in Central Asia SSR, USSR:
37	Shemonaikha, East Kazakhstan Oblast
37	Leninogrosk, East Kazakhstan Oblast
37	Zyryanovsk, East Kazakhstan Oblast
37	
38	Bolshoye Narimskoye, East Kazakhstan Oblast
	Katon-Karagay, East Kazakhstan Oblast
38	Samarka, East Kazakhstan Oblast
38	Koomashkino, East Kazakhstan Oblast
38	Booran, Ecst Kazakhstan Oblast
39	Zaysan, Bast Kazakhstan Oblast
	Phonology and Day-Donne Commentant for Courts there (Least Montant)
	Phenology and Day-Degree Summations for Spring Wheat (Local Varieties)
40	Grown at the Following Localities in the Soviet Par East, USSR:
40	Kartun, Primorskiy (Maritime) Kray
40	Malinovka, Primorskiy (Maritime) Kray
40	Turiy Rog, Primorskiy (Maritime) Kray

Phenology and Day-Degree Summations for <u>Spring Wheat</u> (Local Varieties)

Grown at the Following Localities in the Soviet Far East, USSR (cont'd

- 40 Juravlevka, Primorskiy (Maritime) Kray
- 40 Astrakhanka, Primorskiy (Maritime) Kray
- 40 Anuchino, Primorskiy (Maritime) Kray
- 40 Primorskaya, Primorskiy (Maritime) Kray
- 40 Margaritovo, Primorskiy (Maritime) Kray
- 40 Maykhe, Primorskiy (Maritime) Kray

Phenology and Day-Degree Summations for <u>Spring Wheat</u> Grown at Sapporo, Hokkaido, Japan

- 41 Norin 75 Variety
- 42 Norin 29 Variety
- Range of Day-Degree Summations of Some Wheat Varieties Grown in Some Areas of the Northern Great Plains Region of the United States and in a Number of Their Latitudinal and Climatic Counterpart Areas in Other Countries.

Mean Monthly Temperature Data, Utilized in Conjunction with the Wheat Phenology Records, for the Following Stations in the Northern Great Plains Region of the United States:

- 44 Havre, Montana
- 45 Moccasin, Montana
- 46 Sheridan, Wyoming
- 47 Alliance, Nebraska
- 48 North Platte, Nebraska
- 49 Langdon, North Dakota
- 50 Williston, North Dakota
- 51 Fargo, North Dakota
- 52 Dickinson, North Dakota
- 53 Mandau, North Dakota
- 54 Newell, South Dakota
- 55 Brookings, South Dakota

Mean Monthly Temperature Data, Utilized in Conjunction with the Wheat Phenology Records, for the Following Stations in the USSR:

- 56 Ternopil, Ternopil Oblast, Ukraine SSR
- 56 Borshchiv, Ternopil Oblast, Ukraine SSR
- 56 Bila Krinitsya, Ternopil Oblast, Ukraine SSR
- 57 Bashtanka, Nikolayev Oblast, Ukraine SSR
- 57 Voznyesyensk, Nikolayev Oblast, Ukraine SSR
- 58 Mironovka, Kiev Oblast, Ukraine SSR
- 59 Verkhnyachka, Kiev Oblast, Ukraine SSR
- 60 Kolomiya, Stanislavskiy Oblast, Ukraine SSR
- 60 Dolina, Stanislavskiy Oblast, Ukraine SSR

TABLES

65

65

65

Mean Monthly Temperature Data, Utilized in Conjunction with the Wheat Phenology Records, for the Following Stations in the USSR (continued)

- 61 Prokhladnaya, Kabardino-Balkarskoy ASSR, North Caucasus 61 Bajsan, Kabardino-Balkarskoy ASSR, North Caucasus 61 Nalchik, Kabardino-Balkarskoy ASSR, North Caucasus 62 Gryazi, Lipetsk Oblast, RSFSR 63 Morshansk, Tambov Oblast, RSFSR 64 Shemonaikha, East Kazakhstan Oblast, Central Asia SSR 64 Leninogorsk, East Kazakhstan Oblast, Central Asia SSR 64 Zyryanovsk, East Kazakhstan Oblast, Central Asia SSR 64 Bolshoye Narimskoye, East Kazakhstan Oblast, Central Asia SSR 64 Katon-Karagay, East Kazakhstan Oblast, Central Asia SSR 64 Samarka, East Kazakhstan Oblast, Central Asia SSR 64 Koomashkino, East Kazakhstan Oblast, Central Asia SSR 64 Booran, East Kazakhstan Oblast, Central Asia SSR 64 Zaysan, East Kazakhstan Oblast, Central Asia SSR 65 Kartun, Primorskiy (Maritime) Kray, Soviet Far East 65 Malinovka, Primorskiy (Maritime) Kray, Soviet Far East 65 Turiy Rog, Primorskiy (Maritime) Kray, Soviet Far East 65 Juravlevka, Primorskiy (Maritime) Kray, Soviet Far East 65 Primorskaya, Primorskiy (Maritime) Kray, Soviet Far East 65 Astrakhanka, Primorskiy (Maritime) Kray, Soviet Far East
- Mean Monthly Temperature Data for the Wheat-Growing Seasons from 1949 1954 for Kotoni, Sapporo, Japan.

Maykhe, Primorskiy (Maritime) Kray, Soviet Far East

Anuchino, Primorskiy (Maritime) Kray, Soviet Far East

Margaritovo, Primorskiy (Maritime) Kray, Soviet Far East

CLOSAL CLIMATIC ANALOGUES FOR THE SPRING-CROP SEASON IN THE NORTHERN GREAT PLAINS RECION OF THE UNITED STATES

				_				2		7	ن ک			I KELATIVE	TAVE	1000	TOTAL STATE OF THE
:					AI.	HINGH-BAIL	7	_	HARMEST	ST	_	COOLEST	ST	HOM	HUMIDITY	LEGIC	TELLALION
STATION	COCHERY	10101	PROVINCE	The street	\$1	EASON		NO.	NO E	MONTH OF SEASON	2	MONTH OF SEASON	SEASON	POR S	SEASON	Pive	Maximum
	(State of U.S.)	0					Mean		_			_	_		Daily	£	Occurrence
					2000	Ⅎ	M Leh	Fean	1	_	Σį	+		Mean	E E	Amount	(During Year
					<u>.</u>	۴	<u>.</u>	Α.		<u>.</u>	-	ja.	P.	м	*	Inches	
Kevre	Montens	***		#. 7C. 85	19	67	ス	11	78	79	4.5	51	39	K	42	80	Spring-Summer
Lozovaya	U.S.S.R.	Ukraine	Warkey Oblass	H, 55.87	62	:	n.a.	1.	n. n	n.a.	45	д. В.	n.8.	63	67	01	Spring-Summer
Montley	Montene			#.55.53	19	69	53	72	90	63	746	53	39	53	97	-	Spring-Summer
Voenesensk	U.S.S.A.	Ukraine	Wikelayer Oblast	#. % /s	95			2		 •	47	ë :	n.e.	n.a.	45	6	Spring-Summer
Lengdon	Horth Dehote			M,57,87	57	3	52	38	75	61	39	45	33	69	K	=	Spring-Summer
Tambov	U.S.S.R.	Central Chernozem Tambov Oblast	Tembor Oblass	N. 77. 25	25	63	×	8	73	62	70	43	36	3	51	6	Spring-Summer
Mi not	North Dehote			#.01.93	2	65	51	3	7.5	62	42	87	36	59	43	=======================================	tring-Summer
Kursk	U.S.S.R.	Central Chernozem Kursk Oblast	Kursk Oblese	H, 57, 15	%	62	K	99	20	62	41	4	38	59	53	12	Spring-Summer
Voronesh	U.S.S.R.	Central Charmozem Voronezh Oblast	Voronesh Oblast	N. 07. 15	\$ (5 ;	: S	3	7.	62	45	7,0	36	- - - -	S :	07	Spring-Summer
Markov	C.S.S.R.	Oktaine	Rharkov Oblase	3	3	8	<u> </u>	8	*	2	7.	\$	*	2	6	3	Spring-Summer
Williston	North Dehota			H. 60. 87	8	99	ż	7	77	3	43	78	37	59	43	10	Spring-Summer
Kiev	U.S.S.B.	Ukraine		80,53,m	19	\$9	26	3	73	9	77 :	87	41	59	53	17	Spring-Summer
Kirovograd	U.S.S.R.	Ukra fae	Kirovograd Oblast	#. IC 97	3	<u> </u>	\$	8	*	£4	777	46	0,4	9 9	4.5	0	Spring-Summer
Carrington	North Dehot.s			R, LZ, L3	59	59	52	2	77	63	07	97	34	69	*	12	Spring-Summer
8 legove shehensk	E, S, E, F.	Par Cast	Amur Oblass	#.S1.0X	**	3	23	<u> </u>	92	99	36	41	32	62	05	15	Summer
Euroka	South Dehota			11,97.57	62	69	55	73	8	99	777	25	37	65	52	12	Spring-Summer
Daepropetrovsk Alse-Ats	C.S.S.B.	Centrel Asia	Mazakh S.S.R. 43 16'K	M, 91, 6%	2 2	6 6	× ×	2 2	2 %	99	40	2 22	42	57	46	2 22	Spring-Summer Spring
					,	ï		ì	;							: 	
Redfield Rostov-ne-Donu	South Dehota	Borth Caucasus	Rostor Oblast	#. 77. 17. #. 27. 17.	£ 2	- S	8 8	2 6	78	8 8	40	5 5	43 43	59	¥ %	11 6	Spring-Summer Spring-Summer

1. Morthern Memisphere: April through August (Southern Memisphere - no analogues)

GLOBAL THERMAL AMAIOGUES FOR THE SPRING-CROP SEASON. IN THE MORTHERN GREAT PLAINS REGION OF THE UNITED STATES

		1						TENP	E R A	TURE				~	RELATIVE
					VIA	FIVE-MONTH	-	_	RMEST OF SP	HONTH		COOLEST MONTH OF SEASON	HINOM SON	HUMIDITY FOR SEASON	5 6
STATION	COUNTRY	#EC 10#	PHOV LINCE	14111002		_1	Te es		Keen	Mean		Mean	Mean		
	(State of U.S.)	5			4		Night	Mean	Day	Night	Mean	Day	Night	Mean	
		I WI MAN			Å	_	P	å.	d.	A.	ě.	ę.	, in	*	
				M, 7L. 87	19	67	<u> </u>	11	7.8	62	4.5	51	39	ķ	
Kevre	Monkeys U.S. S. B.	Ukraine	Lvor Oblast	H, 05, 67	9	Ł	56	89	73	63	97	64	42	67	
Dickiniaen	Hereh Debots	Horth Caucasus	Stavropol Kray	M, ZO, S7	609	38	51 56	70	77	23	44	48	35	59	
Euro la	South Dahota Manchuria	South Cratral		M,55,67	63	69	55	73	80 79	99	44	20 00	37	65	
Redfield Geryev	South Debota U.S.S.R.	Control Asia	Kezekh S.S.R. Kezekh S.S.R.	42.25.W 47.07.W 45.07.W	\$ 99 9 99	71 70 73	55 T8	76 78	83 81 84	68 71 71	76 76 75 75	888	40 41 35	67 58 51	

1. Northern Hemisphers: April through August (Southern Memisphers - no analogues).

YEAR-ROUND GLOBAL CLIMATIC ANALOGUES OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

V V

COUNTEXT REGION PROVINCE LATITUDE ANNUAL ANNUAL MARANEST PONTH COLLEST NONTH HUMIDITY Counter of U.S.S.R. OCUTINA PROVINCE LATITUDE Mean Nean Nean Nean Nean Nean Nean Nean N								I	E M P	TEMPERATURE	URE			====	ANNUAL	ANNUAL RELATIVE		PRECIPITATION
State of U.S.) Opposite Courte of U.S.) Opposite Courte of U.S.) Opposite Courte of U.S. Cou	STATION	COUNTRY	RECION	PROVINCE	LATITUDE		ANNUAL		WAR	MEST MD	NTH	T000	EST MON	Ē	HUMI	DITY		
Sorth Dakota West Siberia Altai Kray So ² 24'N 36 44 31 68 75 63 63 65 65 65 65 65 6		(State of U.S.)	COMPUTER			9		Mean	No an	Mean N	ean	_	Mean	fean	١		Annua 1	
Morth Delote West Siberia Altai Kray 52°32'N 37 43 68 75 6i 2 7 -i 72 62 U.S.S.R. West Siberia Altai Kray 52°32'N 35 n.a. 67 n.a. 6i 7 -i 7 62 Horth Delote Central Asia Kazakh S.S.R. 50°24'N 36 44 33 68 75 62 3 8 -2 65 55 North Delote Lower Volga Saratov Oblast 51°32'N 41 47 36 71 77 64 10 15 5 N 13 42 45 36 73 78 68 11 13 9 67 59						ď		J. J.	A.	P P	NO SEA	E C	o F	F	mean %	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Amount	Occurrence
Morth Dakota Central Asia Kazakh S.S.R. 46°10'N 36 44 33 68 75 62 3 8 -2 65 55 Morth Dakota Morth Dakota Lower Volga Saratov Oblast 51°32'N 41 47 36 71 77 64 10 15 5 55 W.S.S.R. Lower Volga Saratov Oblast 51°32'N 42 45 38 73 78 68 11 13 9 67 59	Langdon Biysk	North Dukots U.S.S.R.	West Siberia	Altai Kray		37	43 n.a.	31 n.a.	68		.a.		7 n.a,	.; ej	72	62 63	18	Spring-Summer Summer
Morth Dekote Lower Volga Saratov Oblast 51°32'N 41 47 36 71 77 64 10 15 5 65 55 U.S.S.R.	Minot Semipalatinsk	Horrh Dekots U.S.S.R.	Central Asia	Kezakh S.S.R.	48°10'N 50°24'N	36	77 07	33	89		62 63	m 0	% 4	-3	65	55	12	Spring-Summer Spring-Summer
	Williston Seratov	Worth Dekots U.S.S.R.	Lower Volga	Saratov Oblast	48°09'N 51°32'N	41	47	38 36	7.1 7.3		7 89	110	15	10 0	65	55	15	Spring-Summer Spring-SumFall

YEAR-BOUND CLOBAL THERMAL ANALOGUES OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

North Caucasus Northern Far Eas: Lower Volga	Restov Oblast Sinkiang Primorskíy Kray Volgograd Oblast	N, 27, 87	7 7	n.s. n.s. 45 33 45 35 43 37 49 37 47 40	Might Might Me 38 7 7 33 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	MARKESI MONTH Mean Mean No. "F	MONTH Nean Nean Night 62 63 65 65 65 65 65 65 65 65 65 65 65 65 65	<u> Ш</u>			Mean Mean Man 16 n 16 n 16 n 10 n 10 n 10 n 10 n 10
Lover Volga Southern Southern	Volgograd Oblast	48°42'N 44°52'N 41°48'N 41°48'N	7 9 9 8 9 9 7 7 7 8 9 9 8 9 9 9 9 9 9 9 9 9 9 9 9			74 77 78 77 8 77 8 77 8 77 8 77 8 77 8	833		70 68 73	70 10 68 14 73 10	70 10 68 14 73 10
Lower Volgs	Astrakhan Oblast	43°58'N 46°21'N	77			7.6	84		68	68 19 73 19	68 19 26 1 73 19 21
Horthern	Bokkaido Island	N, 70, 87	45	52 3E 49 39		17,0%	80 75	80 63 75 65	63 65		63 19 65 20

TABLE 5

- postade de la

ATT of State State

SUPPATIONS FOR WINTER WHEAT (Kharkof Variety) PHENOLOGY AND DAY-DEGREE $\frac{1}{2}$

Havre, Montana Lat. 48°34'N; Long. 109°40'W; Elev. 2,488 ft.

					SU	SUMMATION OF DAY-DEGREES	AY-DEGREES	(°F.)	
Crop	Date	Date	Date	Date	Emergence	March 1	Headed	Emergence	March 1
Year *	Sown	Emerged	Headed	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1930-31	Sept. 16	Sept. 24	June 8	July 9	991	865	853	1 87.7	1 718
1931-32	Sept. 16	Sept. 27	June 21	Aug. 1	1,591	1.267	1.180	2,771	2,447
1932-33	Sept. 23	Oct. 2	June 18	July 18	1,077	987	938	2,015	1,925
1933-34		Oct. 1	May 31	July 10	1,084	096	970	2,054	1,930
1934-35	Oct. 1	Oct. 10	June 21	July 22	1,010	812	913	1,923	1,725
1937-38	Oct. 12	Oct. 26	June 16	July 24	296	913	1,073	2,040	1,986
1940-41	Sept. 23	0ct. 4	June 7 ·	July 14	1,224	888	1,029	2,253	1,917
1942-43	Oct. 14	Nov. 2	June 22	Aug. 1	1,071	1,071	1,101	2,172	2,172
1943-44	Sept. 30	Apr. 3	June 12	•	1,033	1,049	686	2,022	2,038
1944-45	Oct. 6	0ct. 16	June 24	July 23	1,001	809	859	1,860	1,668
1945-46	Oct. 3	Oct. 12	June 9	July 20	1,089	606	1,111	2,200	2,020
1947-48	Sept. 16	Sept. 28	June 7	July 22	1,177	785	1,161	2,338	1,946
Mean Standard I Coefficien	Mean Sept. 28 Oct. 24 Standard Deviation Coefficient of Variation (%)	Oct. 24	June 14	July 21	1,109 139 12.5	943 129 13.7	1,015 118 11.6	2, 124 232 10.9	1,958 183 9.3

Source: Based on data from North Montana Agricultural Experiment Station, Havre, and U. S. Weather Bureau.

1/ Computed above 40° P. base.

Some years were not included in this series due to lack of either phenological records or temperature data.

SUMMATIONS FOR WINTER WHEAT (Kharkof Variety) PHENOLOGY AND DAY-DEGREE $^{1/}$

Moccasin, Montana Lat. 47°00'N; Long. 109°45'W; Elev. 4,300 ft.

•	*						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop Year	Dete		Date	Date	Date	Emergence	March 1	Headed	Emergence	March 1
	Sown		Exerged	Headed	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1929-30	Sept.	10	Sept. 19	June 18	July 22	1,155	842	856	2,011	1,698
1931-32	Sept.	12	Sept. 19	June 21	July 29	1,231	853	806	2,139	1,761
1933-34	Sept.	9	Sept. 13	June 3	July 10	1,274	805	756	2,030	1,561
1934-35	Sept.	12	Oct. 3	July 2	July 31	957	725	812	1,769	1,537
1935-36	Sept.	15	Mer. 9	June 26	July 13	1,158	1,158	552	1,710	1,710
1936-37	Sept.	4	Sept. 10	June 25	July 22	1,482	950	723	2,205	1,673
1937-38	Sept.	6	Oct. 7	June 21	July 30	918	718	915	1,833	1,633
1938-39	Sept.	13	n.a.	June 27		!	862	864	1	1,726
1939-40	Sept.	14	n.4.	June 20	July 22	1 1	833	840	:	1,673
1940-41	Sept.	17	n.a.	June 20		!	194	797	;	1,591
1941-42	Sept.	16	Oct. 1	June 30		868	774	812	1,710	1,586
1943-44	n.a.		n.4.	July 2	Aug. 8	•	1,026	807	1 1	1,833
1944-45	n.a.		n.4.		Aug. 2	1 1	688	782	!!!	1,470
1946-47	Sept.	19	n.4.		Aug. 6	•	1,017	792	1 1	1,809
1947-48	n.4.		n.e.	June 21	Aug. 5		650	952	;	1,602
1948-49	D.8.		 •	June 17	July 27	1 1	962	905	!	1,864
Mean	Sept.	12	/7	June 24	July 28	2/	854	820	2/	1,674
Standard Deviation Confficient of Var	eviation	iatio	(%) W			71/2	134 15.7	77	7 2	116
									Ĭl	

Source: Based on data from Central Montana Agricultural Experiment Station, Moccasin, Montana, and U. S. Weather Bureau. Computed above 40°F. base.

Not computed because of small number of cases.

Some years were not included in this series due to lack of either phenological records or temperature data.

n. a. - not available.

TABLE 7

Stanton.

To Lance

The state of the s

.....

PHENOLOGY AND DAY-DEGREE $^{1/}$ SUPPATIONS FOR WINTER WHEAT (Kharkof Variety)

Sheridan, Wyoming Lat. 44°51'N; Long. 106°52'W; Alt. 3,800 ft.

						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
3/ Gron 3/	Dete	Date	Date	Date	Emergence	March 1	Headed	Eme	-
100	Sown	Emerged	He aded	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1006.07	Sc 4==8	70.	Inly 3	July 31	1.142	1,000	756	1,898	1,756
19-07-1	Sept. to		Jun. 18	Aug. 2	1,039	988	1,096	2,135	1,982
1928-29		Oct. 23	July 2	July 27	1,080	1,039	792	1,872	
1929-30	Sept. 18	• • •	June 27	July 22	1,499	1,341	198	2,297	•
1930-31	Sept. 16	0ct. 13	June 28	July 22	1,373	1,342	793	2,166	2,135
1931-32	Sent 15	Sept. 30		July 16	1,299	1,060	792		•
1042-44	Sept. 17	. [~	July 2	July 31	1,300	1,288	986	2,286	
1936-35	Sept. 27	0et. 5		July 22	1,140	878	692	1,909	•
1025-36	Sept 11) - 130 - 130			1,000	821	296	1,967	1,788
1936-37	Sent 22	Oct. 13		July 24	1,208	1,071	345	2,150	2,013
07-0601	Sept 22	5 2			834	650	1,054	1,888	1,704
1961-62	Sept. 11	Sent 19			1,040	748	762	1,802	1,510
74-6701	Sept. 11	Pet 15	June 26	Aug. 2	1,198	1,079	1,030	2,228	2,109
77-7561	Sept. 67	Apr 10		Aug. 7	1,105	1,150	1,035	2,140	2,185
1066.65	; ; ;	Apr. 20	June 26	Aug. 4	797	797	1,071	1,868	1,868
1065-46		0ct. 31		July 24	1,009	1,001	1,043	2,052	2,044
1947-48	Oct. 10	Oct. 24		July 25	926	898	1,201	2,157	2,069
Mean	Sept. 26	Nov. 2	June 22	July 25	1,118	666	935	2,053	1,934
de rd	Devisition				178	203	159	173	228
Coefficien	Coefficient of Variation (%)	on (2)		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	15.9	20.3	17.0	8.4	11.8
		•							

Based on data from U. S. Dry Land Field Station, Sheridan, Wyo., and U. S. Weather Bureau. Source:

Computed above 40°F. base. Deta for Kharkof wheat.

Data for 1933-34, 1937-38, 1938-39, 1940-41 and 1946-47 not available.

PHENOLOGY AND DAY-DEGREE $^{1/}$ SUPPATIONS FOR WINTER WHEAT $^{2/}$ (Kharkof Variety)

Alliance, Nebraska
Lat. 42°10'N; Long 102°56'W; Alt. 4,000 ft.

3/							SUMMATION OF DAY-DEGREES (°F.	DAY-DEGREES	S (°F.)	
Crop	Dete		Date	Date	Date	Emergence	March 1	Headed	Emergence	March 1
	Soun		Eme rged	Headed	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1930-31	Sept.	13	Sept. 19	June 13	July 12	1,485	1,059	961	2,446	2,020
1931-32	n.a.		n.a.	June 13	July 16	•	1,152	966	1 1	2,148
1932-33	Sept.	~	Sept. 8	June 14	July 12	1,524	894	901	2,425	1,795
1937-38	Sept.	14	n.a.	June 10	July 13		819	930	1 1	1,749
1938-39	Sept.	14	n. e .	June 2	July 6	1	794	876	;	1,670
1939-40		11	₽.₽.	June 8	July 10	! !	814	716	:	1,791
1940-41	n.		n.a.	June 8	July 16	:	006	1,009	:	1,909
1941-42	n. 6.		n.a.	June 9		1	695	1,092	!!	1,787
1942-43	Sept.	11	n.a.	June 18		!	971	1,047	;	2,018
1944-45	Sept.	13	n.e.		July 27	t t	949	1,044	1 4	1,688
1945-46	Sept.	m	n.8.	June 3	July 16	!	749	1,182	;	1,931
1946-47	Sept.	Φ.	n.4.	June 12	July 26	!	754	1,224	;	1,978
1948-49		10	n.4.	June 4	July 14	:	808	1,090	;	1,898
1949-50	_	Φ.	n.e.	June 16	July 21	1 1	715	955	!!!	1,670
Mean	Sept. 10	2	141	June 11	July 17	/4/	841	1,020	75	1,861
Coefficient of Variation (%)	neviacion nt of Var	istio	n (Z)	*	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	मेजि	128 16.4	100 9.8	के के	157 8.4

Source: Based on data from Box Butte Experiment Farm, Alliance, Nebr., and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

Data for Rharkof wheat.

Data for 1933-34 through 1936-37, 1943-44 and 1947-48 not available.

[/] Not computed because of small number of cases.

n. a. - not available.

TABLE 9

A September 1

PHENOLOGY AND DAY-DEGREE $^{1/}$ SUMMATIONS FOR WINTER WHEAT $^{2/}$ (Kharkof Variety)

North Platte, Nebraska Lat. 41°05'N; Long. 100°45'W; Alt. 2,805 ft.

Sown Sown Sept. 16 Sept. 25 n.e. Sept. 12 Sept. 19 n.e.	91	Date	Date	Kmeroence		773-3	F	
Sept. 16 Sept. 15 Sept. 25 n.e. Sept. 12 Sept. 19		Headed	2444	to Headed	marcn 1 to Headed	neaded to Ribe	Emergence to Ripe	March 1
Sept. 15 Sept. 25 Sept. 12 Sept. 19	t. 23	May 29	July 3	1.353	804	1 210	2 563	2 014
Sept. 25 n.e. Sept. 12 Sept. 19	-	June 14		1,493	1.493	•	2 839	•
Sept. 12 Sept. 12 Sept. 19		May 21	June 20		940	986	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1,924
Sept. 12 Sept. 19 n.a.	t. 18	June 9		1,708	861	922	2.630	1,783
Sept. 19		June 6	July 4	. :	1,119	954		•
n.e.		May 28	June 28	:	•	910	!	1,855
	. .	June 4	July 2	;	926	906	!!!	1,860
1941-42 Sept. 26 Oct.	۳,	June 6		1,435	1,057	1.107	2,542	2,164
1943-44 Sept. 16 n.a		June 12		1	1,152	925		2,077
		June 1	July 15	!	•	1,150	i i	1,950
1945-46 Sept. 9 n.a		May 21		:	965	•	1 1	2,030
1946-47 n.a. n.a		June 11		:	987	•	;	2,031
1947-48 Sept. 26 n.a		May 25		!	984	^	!	1,915
Sept. 23		June 12		1 1	1.259	1.008	!	7,267
		June 14	July 15	!	950	^	;	•
1950-51 Sept. 15 n.e		June 22		:	_	666	1 1	•
25		June 5	July 2	!	n	945	;	•
Mesn Sept. 19 (4)		June 5	July 9	(7)	1,021	1,018	(4)	2,039
		* * * * * * * * * * * * * * * * * * * *	8 8 8 8	(4)	167	120	(4)	201
coefficient of variation (A)				(4)	16.4	11.8	(4)	6.6

Source: Based on data from Agricultural Experiment Substation, North Platte, Nebr., and U. S. Weather Bureau.

¹ Computed above 40°F. base.

Data for Kharkof wheat.

Data for 1932-33, 1936-37, 1937-38, 1940-41 and 1942-43 not available.

⁴ Not computed because of small number of cases.

n. a. - not available.

PHENOLOGY AND DAY-DEGREE $^{1/2}$ SUMMATIONS FOR WINTER WHEAT $^{2/2}$ (Kharkof Variety)

Lat. 40°51'N; Long. 96°37'W; Alt. 1,230 ft. Lincoln, Nebraska

12						SUMMATION OF DAY-DEGREES (°F.)	DAY-DEGREES	; (°F.)	
Crop	Date	Date	Date	Date	Emergence	March 1	Headed	Emergence	March 1
Year	Sown	Emerged	Headed	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1930-31	Sept. 26	Oct. 2	June 1	June 29	1,510	970	1,075	2,585	2,045
1931-32	Oct. 3	Oct. 8	May 24	June 28	1,578	1,008	1,095	2,673	2,103
1934-35	Sept. 24	0ct. 2	June 6	July 8	1,811	1,073	1,030	2,841	2,103
1935-36	Sept. 27	0ct. 4	May 22	June 23	1,347	1,014	1,043	2,390	2,057
1936-37	Sept. 29	oct. 6	May 30	June 29	1,394	1,043	965	2,359	2,008
1937-38	Oct. 15	Oct. 29	June 6	July 4	1,468	1,426	952	2,420	2,378
1938-39	Sept. 23	Sept. 28	May 24	June 20	1,910	1,060	894	2,804	1,954
1939-40	Sept. 26	Oct. 4	May 30	June 30	1,470	921	1,020	2,490	1,941
1940-41	Sept. 25	Oct. 1	May 28	June 27	1,903	1,193	961	2,864	2,154
1941-42	Sept. 26	Oct. 4	May 28	July 1	1,574	1,078	1,049	2,623	2,127
1942-43	Sept. 24	Oct. 4	June 2	July 6	1,547	1,039	1,153	2,700	2,192
1943-44	Sept. 25	Oct. 1	June 2	July 4	1,451	1,026	1,087	2,538	2,113
1945-46	Oct. 3	Oct. 12	May 24	June 27	1,727	1,353	1,066	2,793	2,419
1946-47	Sept. 24	0ct. 1	June 8	July 14	1,611	1,067	1,138	2,749	2,205
Mean	Sept. 28	Oct. 6	May 30	July 1	1,593	1,091	1,038	2,631	2,129
Standard	Standard Deviation	***********		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	179	125	72	181	126
Coefficia	ent of Veria	Coefficient of Variation (%)		1 1 1 1 1 1 1	11.2	11.5	6.9	6.9	5.9

Source: Based on data from Agricultural Experiment Station, Lincoln, Nebr., and U. S. Weather Bureau.

Computed above 40°F. base. નોલાણ

Data for 1932-33, 1933-34 and 1944-45 not available. Data for Kharkof wheat.

TABLE 11

-

VARIATION IN THE PEAN DAY-DEGREE SUPPATIONS REQUIRED FOR HEADING AND RIPENING
OF KHARKOP VARIETY AT DIFFERENT LATITUDES

		SUMMATIO	SUPPATION OF DAY-DEGREES (°F.)	REES (°F.)		COIIDCE OF DAMA
Locality	Total Fields	Emergence	Headed	Emergence	March 1	SOUNDE OF DAIR
		co neaded	to Ripe	to Ripe	to Ripe	Table No.
Havre, Montana	N, 72.87	1 100		•		
Moccasin, Montana	N, 00, 27	t) t07	1,015	2,124	1,958	5
Sheridan Woming	N, 130 %		079	!!	1,674	9
Alliance Mebracks	N 10 11	7,118	935	2,053	1,934	7
North Platte Makraete	N. 30 c 1 7	1 1	1,020	;	1,861	. σ
Lincoln Nebraeta	E CO 74	1 1	1,018	!	2,039	6
	40 01 R	1,593	1,038	2,631	2,129	10
MeanStandard Deviation	(2)	$\frac{1,273}{3/}$	974 81 8.3	$\frac{2,269}{\frac{3}{3}}$	1,932 137 7.1	

Based on records of pertinent agricultural stations. Source:

Computed above 40°F. base.

Day degrees do not total across because data used in computing means for individual stations were, in some cases, incomplete.
Not computed because of small number of cases.

7

PHENOLOGY AND DAY-DEGREE $\frac{1}{2}$ SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Lat. 48°45'N; Long. 98°21'W; Elev. 1,615 ft.

10	-					SUMMATION (SUMMATION OF DAY-DEGREES (°F.	ES (°F.)	
Crop ±/	Date	Date	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Year	Sown	Emerged	Headed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
1934	Apr. 27	May 9	July 5	Aug. 7	1,338	1,194	096	2,298	2,154
1938	May 13	May 22	July 9	Aug. 15	1,055	926	1,013	2,068	1,969
1939	Apr. 29	May 9	July 2	July 29	1,190	1,046	864	2,054	1,910
1940	Hay 3	May 16	July 5	Aug. 4	1,089	920	831	1,920	1,751
1961	Apr. 28	n.a.	July 2	Aug. 2	1,252	1	895	2,147	!
1942	Apr. 25	n.a.	July 11	Aug. 20	1,064	1	096	2,024	1 1
1943	Apr. 24	n.a.	July 12	Aug. 19	1,189	!	1,030	2,219	1
1944	Apr. 27	n.8.		Aug. 12	1,313	1 1	903	2,216	1
1945	May 4	n.6.	July 20	Aug. 28	1,174	!	286	2,161	!
1946	Apr. 20	n.a.		Aug. 7	1,179	1	006	2,079	1
1948	May 12	May 20		Aug. 17	1,074	954	1,216	2,290	2,170
1949	Apr. 30	n.e.	July 4	Aug. 9	1,178	:	988	2,166	1
1950	May 27	n.8.		Sept. 10	1,283	1	006	2,183	:
1951	Hay 3	May 16	July 8	Aug. 12	1,186	978	855	2,041	1,833
1952	Apr. 23	May 2	July 1	Aug. 8	1,157	1,080	950	2,107	2,030
Yean	May 2	3/	July 8	Aug. 14	1,181	3/	950	2,131	3/
Standard Coeffici	Standard DeviationCoefficient of Variation (%)	on (%)			80 6.8) ଜାନା	8.8 8.8	105	<u>ભ</u> ાભા

Source: Based on data from Agricultural Experiment Substation, Langdon, N. Dak., and U. S. Weather Bureau.

Computed above 40°F. base.

Data for 1935 through 1937 and 1947 not available. Not computed because of small number of cases. નોબાણ

⁻ not available.

TABLE 13

PHENOLOGY AND DAY-DEGREE¹/ SUPPATIONSFOR SPRING WHEAT (Thatcher Variety)

Havre, Montana Lat. 48°34'N; Long. 109°40'W; Alt. 2,488 ft.

							SUMMATIONS OF DAY-DEGREES (F.)	F DAY-DEGREE	S (°F.)	
Crop	Dete		Date	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Year	Sown		Emerged	Readed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
1934	Apr. 18		Apr. 28		July 22	1,142	1,042	1,002	2,144	2,044
1935	Apr. 2		May 10	June 28	July 27	996	858	924	1,890	1,782
1936	Apr. 2		Nay 4			1,180	1,103	911	2,091	2,014
1937	Apr. 2		May 7		July 30	1,147	1,025	1,132	2,279	2,157
1938	Apr. 2		May 10		Aug. 1	975	838	1,129	2,104	1,967
1939	Apr. 2		Hay 4			1,092	1,000	762	1,854	1,762
1940	Nay 10		Nay 17		July 25	1,068	935	868	1,936	1,803
1941	Apr. 2		Nay 5	June 24		1,151	1,061	196	2,118	2,028
1942	Apr. 2		Apr. 30		Aug. 3	1,022	950	984	2,006	1,934
1943	Apr. 2		Yay 1		Aug. 3	1,032	. 942	988	2,020	1,930
1944	Apr. 2		May 5		July 30	1,145	1,013	94,1	2,086	1,954
Hean	Apr. 26	9	May 6	June 25	July 28	1,084	979	964	2,048	1,943
Standard Delvation Coefficient of Vari	elvation t of Var	Veriation (Z)	(%)			81 7.5	84 8.6	95 9.9	122	115 5.9

Source: Based on data from North Montana Agricultural Experiment Station, Havre, Mondana, and U. S. Weather Bureau.

1/ Computed above 40°F. base.

TABLE 14

PHENOLOGY AND DAY-DEGREE SUFFATIONS FOR SPRING WHEAT (Thatcher Variety)

Williston, North Dakota Lat. 48°09'N; Long. 103°35'W; Alt. 1,877 ft.

						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop 4/	De te Sown	Date Emerged	De te Hes de d	Date Ripe	Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
1966	Apr. 20	76 v 6	July 1	Aug. 4	1,263	1,124	776	2,240	2,101
1945		D. B.	July 18		1,329	!!	672	2,001	:
1946	Apr. 11		June 13		817	1	1,150	1,967	:
1947	Apr. 28		July 10		1,241	1 1	936	2,177	;
1948		9.6			1,173	!	1,042	2,215	!
1950		. .	July 6		1,106	;	996	2,072	:
1951		May 11			1,009	849	987	1,996	1,836
1952	Apr. 17	Apr. 24	June 23	July 29	1,178	1,101	948	2,126	2,049
Maan Apr. 20	Apr. 20	3/	July 2	Aug. 4	1,139	13/	960	2,099	3/
Standard D	Standard Delvation	(Z) uo;	-	8 1 8 8 8 8	13.4	ગોળા	10.6	5.4	ોં ભા

Source: Based on data from Agricultural Experiment Substation, Williston, North Dakota, and U. S. Weather Bureau.

Computed above 40°F. base.

Deta for 1949 not available.

/ Not computed because of small number of cases.

n. a. - not available.

TABLE 15

- Constant

PHENOLOGY AND DAY-DEGREE $^{1/}$ SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Moccasin, Montana Lat. 47°00'N; Long. 109°45'W; Alt. 4,300 ft.

27						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop =	Date	Date	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Iear	Sown	Emerged	Headed	Kipe	Headed	to Headed	to Ripe	to Ripe	to Ripe
1930	Apr. 30	May 15	July 2	Aug. 5	886	752	978	1,864	1,730
1931	Apr. 28		July 3	Aug. 7	1,092	1,014	939	2,031	1,953
1932	Apr. 20		• -		1,132	1,008	006	2,032	1,908
1933	Apr. 27	May 13	June 29		892	962	887	1,779	1,683
1934	Apr. 17		June 21	July 26	1,033	973	880	1,913	1,853
1935	Apr. 30		July 8		893	795	912	1,805	1,707
1936	Apr. 29				1,134	954	828	1,962	1,782
1937	Apr. 23	May 5			1,281	1,209	913	2,194	2,122
1938	Apr. 29	May 16	July 5	Aug. 9	924	798	867	1,791	1,665
1941	May 2	May 12			096	830	898	1,828	1,698
1942	Apr. 29	May 16	July 14	Aug. 21	1,001	873	910	1,911	1,783
Mean	Apr. 27	May 11	July 3	Aug. 6	1,021	606	868	1,919	1,807
Standard Deviation	eviation			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	130	139	37	124	138
Coefficien	Coefficient of Variation (7)	on (Z)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.7	15.3	4.1	6.5	7.6
						;			

Source: Based on data from Central Montana Agricultural Experiment Station, Moccasin, Montana, and U. S. Weather Bureau.

 $\frac{1}{2}$ Computed above 40°F. base. $\frac{2}{2}$ Data for 1939 and 1940 not available.

PHENOLOGY AND DAY-DEGREE Variety)

Fargo, North Dakota Lat. 46°54'N; Long. 96°48'W; Elev. 895 ft.

•						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop	Date	Date	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Year	Sown	Emerged	Headed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
1934	Apr. 20	May 2	June 20	July 22	1,260	1,214	958	2,218	2,172
1935	Hay 1	May 17	•	Aug. 1	1,104	912	1,044	2,148	1,956
1936	Apr. 28	May 10	June 23		1,254	1,056	878	2,102	1,904
1937	May 4	May 13		July 29	1,224	1,062	968	2,120	1,958
1938	Apr. 11	Apr. 27			1,052	988	832	1,884	1,820
1939	Apr. 25	Hay 4	June 22		1,207	1,141	1,083	2,290	2,224
1940	Apr. 22	May 15			1,017	807	810	1,827	1,617
1941	May 2	Yay 7			1,268	1,178	916	2,184	2,094
1943	Apr. 23	May 12			1,192	1,039	954	2,146	1,993
1944	Apr. 19	May 8	June 28	July 31	1,245	1,107	945	2,190	2,052
1945	Tay 7	May 22			1,078	958	840	1,918	1,798
1946	Apr. 20	Hey 1			1,149	1,072	887	2,036	1,959
1951	Mey 1	May 9	July 1	Aug. 4	1,219	1,067	943	2,162	2,010
Hean	Apr. 26	May 9	June 29	July 29	1,174	1,046	920	2,094	1,966
Standard D	evietion				91	102	79	137	145
Coefficien	Coefficient of Variation (2)	(Z) uo	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1	7.8	8.6	8.6	6.5	7.4

Source: Based on data from Agricultural Experiment Station, Fargo, N. Dak., and U. S. Weather Bureau.

Same years were not included in this series due to lack of either phenological records or temperature data.

^{1/} Computed above 40°P. base.

TABLE 17

Ш

PHENOLOGY AND DAY-DEGREE- SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Dickinson, North Dakota Lat. 46°53'N; Long. 102°48'W; Alt. 2,460 ft.

Crop Nate Date Sovan to Emergence Headed Fount to Headed Fount to Emergence Fount to Emergence Headed to Ripe For Ripe <th>2/</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>SUMMATION OF</th> <th>DAY-DEGREES</th> <th>(°F.)</th> <th></th>	2/						SUMMATION OF	DAY-DEGREES	(°F.)	
Sovn Ranged Ripe Headed to Headed to Ripe to Ripe to Ripe to Ripe Apr. 18 Apr. 29 July 5 July 25 1,288 1,051 672 1,800 Apr. 16 Apr. 24 June 19 July 25 1,288 1,246 696 1,984 Apr. 12 Apr. 24 June 19 July 21 1,288 1,246 696 1,984 Apr. 12 Apr. 29 June 13 July 21 983 1,755 900 1,755 Apr. 21 Hay 5 June 22 July 24 965 965 935 1,731 1,711 Apr. 20 Apr. 30 June 24 July 24 965 935 1,735 <th>_</th> <th>Pate</th> <th>Dete</th> <th>Date</th> <th>Date</th> <th></th> <th>Emergence</th> <th>Headed</th> <th>Sown</th> <th>Emergence</th>	_	Pate	Dete	Date	Date		Emergence	Headed	Sown	Emergence
Apr. 18 Apr. 29 July 5 July 25 1,128 1,051 672 1,800 1,754 Apr. 16 Apr. 24 Juny 1 July 21 1,288 1,246 696 1,984 1,71 Apr. 22 Hay 7 June 12 July 21 855 795 909 1,755 1,771 1,711 1,755 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 1,771 <t< th=""><th>Year</th><th>Sown</th><th>Rmerged</th><th>Readed</th><th>Ripe</th><th>Headed</th><th>to Headed</th><th>to Ripe</th><th>to Ripe</th><th>to Ripe</th></t<>	Year	Sown	Rmerged	Readed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
Apr. 16 Apr. 30 July 1 July 21 1,246 696 1,984 1,55 1,984 1,55 1,985 1,985 1,985 1,985 1,985 1,985 1,985 1,755 1,711 1,755 1,711 1,755 1,711 1,755 1,711 1,711 1,711 1,711 1,711 1,711 1,711 1,711 1,711 1,711 1,711 1,711 1,712 1,745 1,745 1,745 1,745 1,745 1,745 1,745 1,745 1,745 1,745	1930	Apr. 18	Apr. 29	July 5	7	1,128	^	672	1,800	1,723
Apr. 12 Apr. 24 June 19 July 21 855 795 900 1,755 1,771 1,745 1,171 1,745 1,171 1,745 1,171 1,745 1,745 1,745 1,745 1,745 1,745 1,745 <	1951	Apr. 16	Apr. 30	July 1	July 25	1,288	•	969	1,984	1,942
Apr. 22 Nay 7 June 22 July 21 1,037 981 909 869 1,850 1,530 2,073 1,187 <th< th=""><td>1932</td><th>Apr. 12</th><th>Apr. 24</th><td>June 19</td><td>July 21</td><td>855</td><td>795</td><td>900</td><td>1,755</td><td>1,695</td></th<>	1932	Apr. 12	Apr. 24	June 19	July 21	855	795	900	1,755	1,695
Apr. 16 Apr. 29 June 13 July 21 1,037 985 1,036 2,073 1,013 1,014 2,014	1933	Apr. 22	Hay 7	June 22	July 30	981	606	869	1,850	1,778
Apr. 22 May 9 July 2 July 23 989 764 891 1,711 1,5 Apr. 21 May 5 June 22 July 24 965 935 889 1,878 1,6 Apr. 20 Apr. 30 June 24 July 24 965 935 889 1,18 1,18 Apr. 23 May 8 June 24 July 23 909 792 836 1,745 1,18 Apr. 23 May 8 July 4 Aug. 9 916 836 1,001 1,826 1,745 1,18 Apr. 19 May 8 June 25 Aug. 7 1,002 878 1,020 2,022 1,8 Apr. 27 May 13 July 11 Aug. 16 967 883 957 1,924 1,8 Apr. 26 May 6 July 10 Aug. 10 963 866 910 1,012 2,012 1,924 1,924 1,924 1,924 1,924 1,924 1,924 1,924 1,924 1,924	1934	Apr. 16	Apr. 29	June 13	7	1,037	985	1,036	2,073	2,021
Apr. 21 Nay 5 June 22 July 23 989 915 889 1,878 1,5 Apr. 20 Apr. 30 June 24 July 24 965 935 872 1,837 1,6 Apr. 30 Hay 8 Julne 24 July 23 909 792 885 1,745 1,6 Apr. 19 Hay 8 July 4 Aug. 8 1,008 909 1,001 2,009 1,745 1,75 2,022 1,75 1,75 2,022 1,75 1,702 2,022 1,75	1935	Apr. 22	May 9	July 2	7	820	164	891	1,711	1,655
Apr. 20 Apr. 30 June 24 July 24 965 935 872 1,837 1,65 Apr. 30 Hay 10 June 24 July 23 909 792 836 1,745 1,65 Apr. 23 Hay 8 July 8 Aug. 9 916 836 910 1,745 1,65 Apr. 19 Hay 8 July 4 Aug. 7 1,002 878 1,020 2,009 1,91 Apr. 27 Hay 13 July 11 Aug. 16 967 883 957 1,924 1,8 Apr. 27 Hay 13 July 13 Aug. 16 970 910 1,042 2,012 1,9 Apr. 26 Hay 6 July 10 Aug. 10 963 866 932 1,97 1,7 1,7 1,7 Apr. 27 Hay 6 July 10 Aug. 16 938 866 932 1,870 1,7 Apr. 27 Hay 6 July 3 Aug. 3 1,071 960 888 1,229	1937	Apr. 21	May 5		July 23	686	915	889	1,878	1,804
Apr. 30 Hay 10 June 24 July 23 909 792 836 1,745 1,65 Apr. 23 Hay 8 July 6 Aug. 9 916 836 910 1,826 1,745 1,16 Apr. 19 Hay 4 July 4 Aug. 8 1,008 909 1,001 2,009 1,9 Apr. 19 Hay 8 June 25 Aug. 7 1,002 878 1,020 2,022 1,8 Apr. 27 Hay 13 July 11 Aug. 16 967 883 957 1,924 1,8 Apr. 26 Hay 6 July 5 Aug. 10 963 871 1,213 2,176 2,012 1,9 Apr. 26 Hay 6 July 10 Aug. 16 938 866 1,870 1,870 1,8 1,9 Apr. 26 Hay 6 July 3 Aug. 2 1,071 956 1,012 2,083 1,9 Apr. 21 Apr. 22 Hay 5 June 17 Aug. 2 960 88	1939	Apr. 20	Apr. 30		July 24	965	935	872	1,837	1,807
Apr. 23 May 8 July 6 Aug. 9 916 836 910 1,826 1,7 Apr. 19 Hay 4 July 4 Aug. 8 1,008 909 1,001 2,009 1,9 Apr. 19 Hay 8 June 25 Aug. 7 1,002 878 1,020 2,022 1,5 Apr. 27 Hay 13 July 11 Aug. 16 967 883 957 1,924 1,5 Apr. 27 Hay 1 July 1 Aug. 16 970 910 1,042 2,012 1,7 Apr. 26 Hay 6 July 3 Aug. 10 963 871 1,213 2,176 2,02 Apr. 2 Hay 6 July 3 Aug. 16 938 866 932 1,870 1,7 Apr. 2 Hay 6 July 3 Aug. 3 1,071 960 888 1,229 2,189 2,189 Apr. 2 Hay 5 June 17 Aug. 2 984 905 945 1,929 1,8	1940	Apr. 30	May 10		July 23	606	792	836	1,745	1,628
Apr. 19 May 4 July 4 Aug. 8 1,008 909 1,001 2,009 1,5 Apr. 19 May 8 June 25 Aug. 16 1,002 878 1,020 2,022 1,8 Apr. 27 May 13 July 11 Aug. 16 967 883 957 1,924 1,8 Apr. 27 May 13 July 11 Aug. 16 970 910 1,042 2,012 1,7 Apr. 26 May 7 July 5 Aug. 10 963 871 1,042 2,012 1,917 1,917 1,917 1,917 1,917 1,917 1,042 2,012 1,917 1,76 2,012 1,76 2,012 1,76 2,012 1,76 2,012 1,76 2,012 1,77 2,176 2,012 1,76 2,012 1,77 2,189 1,77 2,189 1,77 2,189 2,189 2,189 2,189 2,189 2,189 2,189 2,189 1,87 1,87 1,87 1,87 1,8	1942	Apr. 23	May 8		Aug. 9	916	836	910	1,826	1,746
Apr. 19 Hay 8 June 25 Aug. 7 1,002 878 1,020 2,022 1,8 Apr. 27 Hay 13 July 11 Aug. 16 967 883 957 1,924 1,8 Apr. 27 Apr. 19 June 20 July 25 931 805 986 1,917 1,7 Apr. 26 Hay 6 July 5 Aug. 10 963 871 1,213 2,176 2,012 1,917 1,7 Apr. 28 July 10 Aug. 16 938 866 932 1,870 1,7 Apr. 26 Hay 6 July 3 Aug. 16 956 1,012 2,083 1,9 Apr. 21 Apr. 30 June 17 Aug. 3 960 888 1,229 2,189 <th< th=""><td>1943</td><th>Apr. 19</th><th>May 4</th><td></td><td></td><td>1,008</td><td>606</td><td>1,001</td><td>•</td><td>1,910</td></th<>	1943	Apr. 19	May 4			1,008	606	1,001	•	1,910
Apr. 27 Hay 13 July 11 Aug. 16 967 883 957 1,924 1,8 Apr. 5 Apr. 19 June 20 July 25 931 805 986 1,917 1,7 Apr. 26 Hay 7 July 5 Aug. 10 963 871 1,042 2,012 1,5 Apr. 22 Hay 6 July 10 Aug. 16 938 866 932 1,870 1,7 Apr. 26 Hay 6 July 3 Aug. 16 938 1,071 956 1,012 2,083 1,99 Apr. 21 Apr. 30 June 17 Aug. 3 960 888 1,229 2,189 2,1 Art 22 Hay 5 June 28 Aug. 2 984 905 945 1,929 1,47 Action Overlation (X) Aug. 2 984 905 945 1,37 1,47 1	1944	Apr. 19	May 8			1,002	878	1,020	•	1,898
Apr. 26 Apr. 19 June 20 July 25 931 805 986 1,917 1,7 Apr. 26 Hay 7 July 5 July 5 July 7 Aug. 10 963 970 910 1,042 2,012 1,917 1,7 Apr. 22 Hay 6 June 27 July 10 Aug. 16 938 866 938 871 1,213 2,176 2,012 2,012 1,7 2,012 1,	1945	Apr. 27	Hay 13			196	883	957	•	1,840
Apr. 26 May 7 July 5 Aug. 10 970 910 1,042 2,012 1,52 Apr. 22 May 28 June 27 Aug. 10 963 871 1,213 2,176 2,02 May 19 May 28 July 10 Aug. 16 938 866 932 1,870 1,7 Apr. 26 May 6 July 3 Aug. 9 1,071 956 1,012 2,083 1,9 Apr. 21 Apr. 30 June 17 Aug. 3 960 888 1,229 2,189 2,1 Apr. 22 May 5 June 28 Aug. 2 984 905 945 1,929 1,8 Adard Deviation Aug. 2 984 89 130 147 1 Adard Deviation (X) Aug. 2 984 9.8 13.0 14.7 1	1946	Apr. 5	Apr. 19		July 25	931	805	986	1,917	1,791
Apr. 22 Hay 6 June 27 Aug. 10 963 871 1,213 2,176 2,0 Hay 19 Hay 28 July 10 Aug. 16 938 866 932 1,870 1,7 Apr. 26 Hay 6 July 3 Aug. 9 1,071 956 1,012 2,083 1,9 Apr. 21 Apr. 30 June 17 Aug. 3 960 888 1,229 2,189 2,1 dard Deviation Aug. 2 984 905 945 1,929 1,8 dard Deviation Aug. 2 984 89 130 147 1 ficient of Variation (Z) Aug. 2 9.8 13.8 7.6 7	1947	Apr. 26	May 7		Aug. 9	970	910	1,042	•	1,952
May 19 Hay 28 July 10 Aug. 16 938 866 932 1,870 1,71 Apr. 26 Hay 6 July 3 Aug. 9 1,071 956 1,012 2,083 1,9 Apr. 21 Apr. 30 June 17 Aug. 3 960 888 1,229 2,189 2,1 dard Deviation May 5 June 28 Aug. 2 984 905 945 1,929 1,8 dard Deviation May 5 June 28 Aug. 2 984 89 130 147 1 ficient of Variation (7) May 5 130 147 1	1948		May 6		7	963	871	1,213	•	•
Apr. 26 May 6 July 3 Aug. 9 1,071 956 1,012 2,083 1,9 Apr. 21 Apr. 30 June 17 Aug. 3 960 888 1,229 2,189 2,1 Apr. 22 May 5 June 28 Aug. 2 984 905 945 1,929 1,8 dard Deviation Aug. 2 84 89 130 147 1 ficient of Variation (Z) Variation (Z) 8.5 9.8 13.8 7.6 7	1950		May 28		~	938	998	932	•	•
Apr. 21 Apr. 30 June 17 Aug. 2 960 888 1,229 2,189 2,1 Apr. 22 May 5 June 28 Aug. 2 984 905 945 1,929 1,8 dard Deviation	1951		May 6		Aug. 9	1,071	926	1,012	•	1,968
dard Deviation May 5 June 28 Aug. 2 984 905 945 1,929 1,8 dard Deviation Marciation <	1952	Apr. 21	Apr. 30		Aug. 3		888		• •	2,117
Deviation (%) 130 147 1 int of Variation (%) 13.8 7.6 7		- Apr. 22	Nay 5	June 28	1	786	905	945	1,929	1,850
(Z)	Standard	Deviation			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	84	88	130	147	144
	Coefficien	nt of Variati	(Z) uo;		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.5	•	13.8	7.6	7.8

Source: Based on data from Agricultural Experiment Substation, Dickinson, North Dakota, and U. S. Weather Bureau.

الإلا

Computed above 40°F. base.
Data for 1936, 1938, 1941 and 1949 not available.

TABLE 18

PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Mandan, North Dakota Lat. 46°50'N; Long. 100°55'W; Alt. 1,750 ft.

77						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop	Date	Date	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Year	Sown	Emerged	Headed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
1931	Apr. 13	Apr. 25	June 22	July 25	1,133	1,073	1,005	2,138	2,078
1932	Apr. 14	Apr. 23	June 19	July 23	1,084	1,030	1,006	2,090	2,036
1933	Apr. 20	Apr. 29	June 20	July 15	1,126	1,108	814	1,940	1,922
1934	Apr. 13	Apr. 24		July 17	1,260	1,205	096	2,220	2,165
1935	Apr. 19	May 1	June 26	July 26	860	860	985	1,845	1,845
1937	Apr. 16	May 4	June 21	July 21	1,068	584	880	1,948	1,864
1938	Apr. 13	Apr. 24	June 18	July 21	953	887	928	1,911	1,845
1939	Apr. 12	Apr. 25	June 16	July 16	1,054	1,015	825	1,879	1,840
Mean Apr. 15	Apr. 15	Apr. 27	June 20	July 21	1,067	1,020	929	1,996	1,949
Standard Deviation	eviation			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	105	105	84	144	135
Coefficien	Coefficient of Variation (I)	on (2)			8.6	10.3	0.6	7.2	6.9

Source: Based on data from U. S. Morthern eat Plains Field Station, Mandan, North Dalota, and U. S. Weather Bureau.

 $\frac{1}{2}$ Computed above 40°F. base. $\frac{2}{2}$ Data for 1936 not available.

TABLE 19

PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Sheridan, Wyoming Lat. 44°51'N; Long. 106°52'W; Atl. 3,800 ft.

16						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop =/ Year	Dete Sown	Date Emerged	Date Headed	Date Ripe	Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
1934	Apr. 18	Apr. 26	June 15	July 19	1,123	1,067	1,030	2,153	2,097
1935	Apr. 19	May 3	July 7	July 30	1,088	1,072	805	1,893	1,877
1936	Apr. 24	May 4	June 18	July 17	1,151	1,081	1,017	2,168	2,098
1937	Apr. 15	May 1	June 22	July 27	1,042	978	986	2,028	1,964
1938	Apr. 15	Apr. 26			928	903	938	1,896	1,841
1939		Apr. 30	June 25		1,073	1,013	1,077	2,150	2,090
1940		May 3	June 17		926	880	959	1,885	1,839
1961		Hay 2			1,079	1,035	865	1,944	1,900
1942		Apr. 28	June 29	July 28	954	863	848	1,802	1,711
1943	Apr. 15	Apr. 28			1,039	606	1,054	2,093	1,963
1944		Hay 8	July 1	Aug. 11	1,086	924	1,107	2,193	2,031
1951	Apr. 25	May 6		Aug. 5	847	192	1,151	1,998	1,912
Mesa	- Apr. 20	May 2	June 25	July 28	1,030	957	786	2,017	1,944
Standard Coefficies	Standard Deviation	on (%)			8.8	105 11.0	108 10.9	143 7.1	121 6.2

Source: Based on data from U. S. Dry Land Field Station, Sheridan, Wyoming, and U. S. Weather Bureau.

 $\frac{1}{2}$ / Computed above 40°F. base. $\frac{2}{2}$ / Data for 1945 through 1950 not available.

TABLE 20

PHENOLOGY AND DAY-DEGREE $^{1/}$ SUMMATIONS FOR SPRING WHEAT (Thatcher Variety) $^{2/}$

Newell, South Dakota Lat. 44°44'N; Long. 103°27'W; Elev. 2,816 ft.

7.0						SUMMATION OF DAY-DEGREES (°F.)	DAY-DEGREES	(°F.)	i
Crop 2/	Date	Date	Date Haaded	Date Ripe	Sown to Headed	Emergence to Headed	Headed to Ripe	Sown . to Ripe	Emergence to Ripe
1935		May 16	Tuly 5	A110. 3	1.087	952	1.059	2.146	2.011
1936	Apr. 22	6 A N		July 23	1,457	1,281	1,057	2,514	2,338
1937		FEV 3	July 5	Aug. 2	1,450	1,378	953	2,403	2,331
1938		7 A.		July 28	1,254	1,172	891	2,145	2,063
1961		Yay 6		Aug. 2	1,257	1,122	1,198	2,455	2,320
1942		May 11	June 30	Aug. 6	1,117	819	1,101	2,218	1,920
1944		Hay 11		Aug. 5	1,137	945	1,078	2,215	2,023
1950	May 18	Hay 27	July 12	Aug. 17	1,138	1,048	895	2,130	2,040
Mean Apr. 24 Standard Deviation	Apr. 24 eviation	Hay 11	July 2	Åug. 3	1,237	1,090	1,041	2,278	2,131
Coefficien	Coefficient of Variation (X)	on (Z)		: : : : :	11.9	1./1	0.0	†• /	0

Source: Based on data from U. S. Belle Fourche Field Station, Newell, South Dakota, and U. S. Weather Bureau.

Computed above 40°F. base.

Irrigated during each of the years given. Deta for 1939, 1940, 1943, and 1945 through 1949 not available. નોલાણ

TABLE 21

PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Brookings, South Dakota Lat. 44°18'N; Long. 96°45'W; Elev. 1,628 ft.

•						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Crop	Date Sown	Date Emerged	Date Headed	Date Ripe	Sown to Headed	Emergence to Headed	Headed t∵ Ripe	Sown to Ripe	Emergence to Ripe
1934	Apr. 17	Hay 1	June 22	July 14	1,700	1,602	756	2,456	2,358
1935	Apr. 22	May 4	June 29	July 24	1,062	1,008	945	2,007	1,953
1936	Apr. 16	Apr. 30		July 16	1,288	1,274	910	2,198	2,184
1937	Hay 4	Hay 11	June 27	July 26	1,210	1,070	1,000		2,070
1938	Apr. 11	Apr. 22	June 21	July 17	1,137	1,060	898	2,005	1,928
1939	Apr. 1	Apr. 23	June 10	July 14	1,186	1,076	1,090	_	2,166
1940	Apr. 20	May 3	June 23	July 24	1,176	1,109	1,052		2,161
1941	Apr. 29	Hay 5	June 26	July 23	1,406	1,296	883	2,289	2,179
1942	Apr. 15	Apr. 23	June 27	Aug. 5	1,260	1,172	1,181	2,441	2,353
1950	Apr. 20	149 9	June 26	Aug. 3	1,109	266	1,024	2,133	2,021
Hean	Apr. 19	Hay 1	June 23	July 23	1,253	1,166	971	2,224	2,137
Standard D Coefficien	Standard Deviation	(%) uo			161 12.8	170 14.6	123 12.7	142 6.4	145 6.8

Source: Besed on data from Agricultural Experiment Station, Brookings, S. Dak., and U. S. Weather Bureau.

Some years were not included in this series due to lack of either phenological records or temperature data. 1/ Computed above 40°F. base.

TABLE 22

PHENOLOGY AND DAY-DEGREE SUPPATIONS FOR SPRING WHEAT (Thatcher Variety)

Alliance, Nebraska Lat. 42°10'N; Long. 102°56'W; Elev. 4,000 ft.

Date Date Date Sown to Sown to Sown Emergence Headed Sown to Sown To Ripe	16						SUMMATION OF DAY-DEGREES	DAY-DEGREES	(°F.)	
Apr. 19 June 12 July 13 1,195 1,125 957 2,152 8 n.a. July 10 July 28 1,143 594 1,737 6 n.a. July 10 July 28 1,143 594 1,737 9 n.a. June 20 July 24 1,079 764 1,945 9 n.a. June 20 July 24 1,079 764 1,945 9 n.a. June 11 July 24 1,079 764 1,945 Apr. 26 June 17 July 12 1,052 1,016 799 1,851 3 Apr. 24 June 16 July 24 1,054 954 1,081 2,185 Apr. 24 June 16 July 27 982 1,244 2,226 n.a. June 12 July 27 991 1,149 2,140 s June 12 July 22 1,069	Crop 2/	Date	Dete	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Apr. 19 Jume 12 July 13 1,195 1,125 957 2,152 2,152 2,152 2,152 2,152 2,152 2,152 2,152 2,152 2,157 1,737 2,157 1,737 2,157 1,737 2,157 1,945 1,737 1,722 2,157 1,945 1,737 1,722 2,157 2,101 2,157 2,102 2,101 2,102 2,102 2,103	Year	Sown	Emerged	Headed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
8 n.a. July 10 July 28 1,143 594 1,737 6 n.a. June 20 July 13 1,181 764 1,945 9 n.a. July 3 July 26 1,375 764 1,945 9 n.a. June 20 July 24 1,079 1,020 2,157 Apr. 26 June 11 July 14 1,052 1,016 799 1,851 1 Apr. 24 June 16 July 24 1,054 954 1,081 2,135 2 3 Apr. 24 June 28 July 24 1,054 954 1,081 2,135 2 3 Apr. 24 June 28 July 28 955 856 1,125 2,080 1 6 July 27 982 1,244 2,246 2,246 9 June 25 Aug. 1 991 1,149 2,140 9 June 21	1934	Apr. 9	Apr. 19	June 12	July 13	1,195	1,125	957	2,152	2,082
6 n.a. June 20 July 13 1,181 764 1,945 9 n.a. July 3 July 26 1,375 782 2,157 9 n.a. June 20 July 24 1,079 1,022 2,101 n.a. June 11 July 16 1,000 1,020 2,020 Apr. 26 June 17 July 12 1,052 1,016 799 1,851 1 Apr. 27 June 16 July 24 1,054 954 1,081 2,135 2,080 n.a. June 22 July 28 955 856 1,125 2,080 1 Apr. 24 June 22 July 28 982 1,244 2,226 n.a. June 12 July 27 991 1,149 2,140 5 n.a. June 21 July 23 1,060 1,128 2,188 14to 1,128 2,188 1 July 23 1,069 3/ 187 163 1 June 21 July 23 1,069 3/ 1972 163	1935	Apr. 18	n.e.	July 10	July 28	1,143	!	594	1,737	!
0 n.e. July 3 July 24 1,375 782 2,157 9 n.e. June 20 July 24 1,079 1,020 2,101 Apr. 26 June 11 July 12 1,052 1,016 799 1,851 1 Apr. 27 June 16 July 24 1,054 954 1,081 2,135 2 Apr. 24 June 22 July 24 1,054 954 1,081 2,135 2 Apr. 24 June 22 July 28 955 856 1,125 2,080 1 n.e. June 28 July 21 982 1,244 2,26 n.e. June 25 Aug. 1 1,060 1,149 2,140 s n.e. June 12 July 23 1,060 1,149 2,140 s n.e. June 21 July 23 1,069 1,128 2,188 s June 21 July 23	1936	Mar. 26	n.a.		July 13	1,181	1	164	1,945	:
9 n.e. June 20 July 24 1,079 1,022 2,101 Apr. 26 June 11 July 16 1,000 1,020 2,020 Apr. 27 June 17 July 12 1,052 1,016 799 1,851 1 3 Apr. 27 June 22 July 24 1,054 954 1,081 2,135 2 3 Apr. 24 June 22 July 28 955 856 1,125 2,080 1 4 June 22 July 27 982 1,244 2,226 0 n.a. June 25 Aug. 1 991 1,149 2,140 5 n.a. June 12 July 22 1,060 1,149 2,140 3/ June 21 July 23 1,060 1,128 2,042 4 June 21 July 23 1,069 3////////////////////////////////////	1937	Mar. 30	n.4.	July 3	July 26	1,375	!	782	2,157	1
Apr. 26 June 11 July 16 1,000 1,020 2,020 Apr. 27 June 17 July 12 1,054 954 1,016 799 1,851 1 Apr. 27 June 16 July 24 1,054 955 856 1,081 2,135 2 Apr. 24 June 22 July 28 955 856 1,125 2,080 1 Apr. 24 June 28 July 27 982 1,244 2,226 0 n.a. June 16 July 27 982 1,149 2,140 5 n.a. June 12 July 22 1,060 1,128 2,140 5 n.a. June 12 July 23 1,060 1,128 2,042 4 June 21 July 23 1,069 3////>1,187 163 4 June 21 July 23 1,069 3////>2///////////////////////////////	1938	Hr. 29	n.e.	•	July 24	1,079	1 1	1,022	2,101	!
Apr. 26 June 17 July 12 1,052 1,016 799 1,851 1 Apr. 27 June 16 July 24 1,054 954 1,081 2,135 2 Apr. 24 June 22 July 28 955 856 1,125 2,080 1 Apr. 24 June 28 July 21 982 1,244 2,226 n.a. June 15 July 27 982 1,149 2,140 5 n.a. June 12 July 22 1,060 1,128 2,140 3/4 June 21 July 22 1,060 1,128 2,042 ietion (7) 121 3/4 2,042 187 187 163 188 163 163 189 163 163	1939	Apr. 3	n.a.		July 16	1,000	1	1,020	2,020	:
Apr. 27 June 16 July 24 1,054 954 1,081 2,135 2 Apr. 24 June 22 July 28 955 856 1,125 2,080 1 Apr. 24 June 28 July 31 831 831 981 1,812 1 n.a. June 16 July 27 982 1,244 2,226 1 n.a. June 25 Aug. 1 991 1,149 2,140 s n.a. June 12 July 22 1,060 1,128 2,140 s June 21 July 23 1,069 3/// 973 2,042 iation (7) 121 3// 187 163 intin 3// 19.2 3// 19.2 8.0	1940	Apr. 8	Apr. 26		July 12	1,052	1,016	199	1,851	1,815
3 Apr. 24 June 22 July 28 955 856 1,125 2,080 1 Apr. 24 June 28 July 31 831 831 981 1,812 1 n.a. June 16 July 27 982 1,244 2,226 n.a. June 25 Aug. 1 991 1,149 2,140 5 n.a. June 12 July 22 1,060 1,128 2,140 3/ June 21 July 23 1,069 3///3//3//3//3//3//3//3//3//3//3//3//3/	1961	Apr. 7	Apr. 27		July 24	1,054	954	1,081	2,135	2,035
Apr. 24 - June 28 July 31 831 831 981 1,812 1 n.a. June 16 July 27 982 982 1,244 2,226 o.n.a. June 25 Aug. 1 991 1,149 2,140 s. n.a. June 12 July 22 1,060 1,060 1,128 2,140 3/ June 21 July 23 1,069 3/ 973 2,042 ietion (2) 3/ 187 163 11.3 3/ 19.2 8.0	1943		Apr. 24		July 28	955	856	1,125	2,080	1,981
0 n.a. June 16 July 27 982 1,244 2,226 5 June 25 Aug. 1 991 1,149 2,140 1,160 2,140 1,1069 2,140 1,128 2,188 1,069 3/ 973 2,042 121 3/ 187 163 163 163 11.3 3/ 19.2 8.0	1945	_	Apr. 24 .		July 31	831	831	981	1,812	1,812
0 n.a. June 25 Aug. 1 991 1,149 2,140 - 5 n.a. June 12 July 22 1,060 1,128 2,188 - 3/ June 21 July 23 1,069 3/ 973 2,042 121 3/ 187 163 14ation (%) 1,149 2,140 1,160 2,140 1,160 2,188	1946	Apr. 5	n.e.			982	1	1,244	2,226	8 8
S n.a. June 12 July 22 1,060 1,128 2,188 $\frac{3}{1}$ June 21 July 23 1,069 $\frac{3}{1}$ 973 2,042 161 121 $\frac{3}{1}$ 187 163 163 1.3 $\frac{3}{1}$ 19.2 8.0	1047	Apr. 10	n. a.		Aug. 1	991		1,149	2,140	:
3/ June 21 July 23 1,069 $\frac{3}{3}$ / 973 istion (%) 121 $\frac{3}{3}$ / 187 11.3 $\frac{3}{2}$ / 19.2	1948	Mar. 25	n.a.		July 22	1,060	!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	1,128	2,188	i i
istion (%) 11.3 3/ 19.2	Mean	- Apr. 5	3/	June 21		1,069	3/	973	2,042	\rightarrow 100 \rightarrow 10
	Standard Coefficie	uevistion nt of Variati	ton (%)			11.3	ો <u>ખ</u> ા	19.2	8.0	ગુણા

Source: Based on data from Box Butte Experiment Farm, Alliance, Nebraska, and U. S. Weather Bureau.

1/ Computed above 40°P. base.

/ Data for 1942 and 1944 not available. / Not computed because of small number of cases.

n. a. - not available.

TABLE 23

C. Acceptance

0

PHENOLOGY AND DAY-DEGREE SUPPATIONS FOR SPRING WHEAT (Thatcher Variety)

North Platte, Nebraska Lat. 41°05'N; Long. 100°45'W; Elev. 2,805 ft.

10						SUMMATION (SUMMATION OF DAY-DEGREES (°F.)	ES (°F.)	
Crop 2/	Date Sown	Date Emerged	Date Headed	Date Ripe	Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
1936	Apr. 14	n.4.	June 15	July 7	1,325	•	786	2,111	1
1937	Mar. 30	n.4.	June 6	July 4	1,093	•	817	1,910	!
1938		n. n.	June 9	July 5	1,203	;	830	2,033	1 8
1939	Mar. 21	Apr. 5	June 8	July 3	1,255	1,219	770	2,025	1,989
1941	Mar. 29	n.a.	June 9	July 6	1,337		813	2,150	:
1944	Apr. 12	п.8.	June 22	July 22	1,398		975	2,373	1 1
1945	Apr. 8	□. ₽. □	June 26		1,184		985	_	1
1947		n.a.	June 26		1,236	:	1,043	2,279	i i
1948	Mar. 24	n.a.	June 5	July 12	1,243	:	1,113	2,356	1
1951	Apr. 4	n.a.	June 28	July 31	1,291	!	963	2,254	i
1952	Apr. 8	. d	June 16	July 10	1,244	!!!	840	2,084	:
Nean	- Apr. 3	3/	June 16	July 14	1,255	\estruction \(\text{\text{\$1.00}} \)	903	2,158	3/2
Standard	Standard DeviationCoefficient of Variation (%)	ion (%)	,	# : : : : : : : : : : : : : : : : : : :	6.0	<u>ખો</u> ભા	128 14.2	140 6.8	/iei

Source: Based on data from Agricultural Experiment Substation, North Platte, Nebraska, and U. S. Weather Bureau.

Data for 1940, 1942, 1943, 1946 and 1949 and 1950 not available. Computed above 40°P. base. الإلايات

Not computed because of small number of cases.

- not available.

TABLE 24

SUMMATIONS REQUIRED FOR HEADING AND RIPENING OF THATCHER VARIETY AT DIFFERENT LATITUDES VARIATION IN THE MEAN DAY-DEGREE

		S	SUMMATION OF DAY-DEGREES		(°F.)	SOURCE OF DATA
•	ı	Sown to	Headed	Sown to	Emergence	
Locality	Latitude	Headed	to Ripe	Ripe	to Ripe	Table No.
Langdon, North Dakota	N,57,87	1,181	950	2,131	1 1	12
Havre, Montana	N, 58, 85	1,084	964	2,048	1,943	13
Williston, North Dakota	N,60.87	1,139	096	2,099	!!	14
Moccasin, Montana	N,00°74	1,021	858	1,919	1,807	15
Pargo, North Dakota	M, 75, 97	1,174	920	2,094	1,966	16
Dickinson, North Dakota	46°53'N	984	945	1,929	1,850	17
Mandon, North Dakota	N,05,95	1,067	929	1,996	1,949	18
Sheridan, Wyoming	N, 15, 77	1,030	987	2,017	1,944	19
Newell, South Dakota	N, 57, 57	1,237	1,041	2,278	2,131	20
Brookings, South Dakota	N,81,77	1,253	971	2,224	2,137	21
Alliance, Nebraska	42°10'N	1,069	973	2,042	!!!	22
North Platte, Nebraska	41°05'N	1,225	903	2,158	!	23
Mean Standard Deviation		$ \begin{array}{c} 1,122 \\ 100 \\ 8.9 \end{array} $	953 ² / 37 3.9	2,078 108 5.2	1,966 105 5.3	

Source: Based on records of pertinent agricultural stations.

^{1/} Computed above 40°F. base.

[&]quot;ay degrees do not total across because data used in computing means for individual stations were, in some cases, incomplete.

TABLE 25

Commence of the second second

1

PHENOLOGY AND DAY-DEGREE 1 SUMMATIONS FOR WINTER WHEAT (0D 3 Variety)

Vosnyesyensk, Nikolayev Oblast, Ukraine SSR, USSR Lat. 47°34'N; Long. 31°20'E; Elev. 109 ft.

							SUMMA	SUMMATIONS OF DAY-DECREES	Y-DECREES	(°F.)	
Crop	Date	Date		Date	Sown to	Emergence	Mar.1 to	Headed to	Sown to	Emergence	Mar. 1 to
Year	Sown	Emerged	Headed	Wax Ripe	Headed	to Headed	Headed	Wax Ripe	Wax Ripe	to Wax Ripe	Wax Ripe
1946-47	Sept. 16	Sept. 26		Jul. 1	1,218	1,028	685	864	2,082	1,892	1,549
1947-48	Aug. 25	Sept. 1		Jun. 25	1,687	1,313	999	733	2,420	2,046	1,399
1948-49	Aug. 30	Sept. 2		-	1,542	1,028	999	. 858		1,886	1,524
1949-50	Sept. 16	Oct. 10	Yay		1,104	747	571	828		1,575	1,399
1950-51	Aug. 26	Sept. 10	Tay		1,563	1,218	571	828		2,046	1,399
1951-52	Sept. 7	Oct. 5	Tay		1,427	939	723	856		1,795	1,579
1952-53	Sept. 14	Sept. 2	20 Hay 31	Jun. 30	1,351	1,237	780	744	2,095	1,981	1,524
1953-54	Sept. 5		Jun.		1,641	1,356	899	770	2,411	2,126	1,669
1954-55	Aug. 31				1,627	1,427	780	1,039		2,466	1,819
Mean	Sept. 5	Sept. 22	12 Hay 27	Jun. 30	1,462	1,143	705	836	2,298	1,979	1,540
Standard	Standard Deviation-	• • • • • • • • • •			209	232	101	77	148	147	127
Coeffici	Coefficient of Variation (2)	istion (2	(:	* * * * * * * * * * * * * * * * * * * *	14.3	20.3	14.3	9.2	6.4	7.4	8.2

Source: Based on data of Agroklimaticheskii Spravochnik Po Nikolayevskoi Oblasti, Ukraine SSR. Leningrad, 1959.

1/ Computed above 40°F. base.

AVERAGE PHENOLOGY AND DAY-DEGREE $^{1/}$ SUMMATIONS FOR WINTER WHEAT

Ternopil, Ternopil Oblast, Ukraine SSR, USSR Lat. 49°34'N; Long. 25°36'E; Elev. 1,069 ft.

YERITKOSPYERMIH 15 VARIETY

Date	Dere		2440		C		SUMMA	SUMMATION OF DAY-DEGREES (°F.)	-DEGREES (°F.)	
Soun	Emerged	43	Readed	Vax Kipe	Sown to Readed	Emergence to Headed	Mar. 1 to Headed	Headed to	Sown to Wax Ripe	Emergence to Wax Rine	Mar. 1 to
Sept. 6	Sept. 6 Sept. 16	91	Jun. 8	Jul. 18	1,362	1,212	801	931	2,293	1	1,732
				Borshch Lat. 4	itv, Ternopi 8'48'N; Lon	Borshchiv, Ternopil Oblast, Ukraine SSR, USSR Lat. 48°48'N; Long. 26°02'E; Elev. 937 ft.	craine SSR, Elev. 937 f	USSR t.			
YERITROS	YERITROSPYERMEM VARIETY	VARI	ETY							i	
Sept. 8	Sept. 18	80	Jun. 3	Jul. 8	1,336	1,176	751	791	2,127	1,967	1,542
				Bila Krinic	Bila Krinitsya, Ternopil Lat. 50°08'N; Long.	1	Oblast, Ukraine SSR, USSR 25°44'E; Elev. 756 ft.	ussr ft.			
LOCAL VARIETY	RIETY										
Sept. 7	Sept. 18	90	Jun. 6	Jul. 17	1,357	1.181	756	950			

2,131 Source: Eased on data of Agroklimatychnyi Dovidnyk po Ternopil's'koi Oblasti, Ukraine SSR. Kiev, 1959. ! 950 756 1,181

1 Computed above 40°P. base.

TABLE 27

Γ.

C

 $\frac{1}{2}/$ PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR WINTER WHEAT (Local Variety)

Mironovka, Kiev Oblast, Ukrainian S.S.R. Lat, 49°40'N; Long. 31°00'E; Elev. 600 ft.

					SUMM	SUMMATION OF DAY-DEGREES	-DEGREES	(F.)	
Crop	Date	Date	Date	Date	Emergence	March 1	Headed	Emergence	March 1
Year *	Sown	Emersed	Headed	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1922-23	Sent. 15	n.a.	June 1	July 17	:	773	1,122	1 1	1,895
1923-24		, e	June 4	July 6	!	928	972	1 1	1,900
1924-25	Sent	. c	May 27	July 11	1	812	1,000	-	1,812
1925-26	Sent. 9	. e.	June 2	July 13	: :	885	1,085	1	1,970
1926-27	Sept. 2	n.a.	June 3	July 7	 	732	796	!!!	1,696
1928-29	Sept. 11	n.a.	June 16	July 27	1	1,028	1,017	!!!	2,045
1929-30	Sept. 10	n.a.	June 4	July 17	 	868	1,053	:	1,951
Mean	Mean Sept. 8		June 4	July 14	-	865	1,030	1 1	1,895
Standard Deviation Coefficient of Vari	Standard Deviation	uo		L F F F F F F F F F F F F F F F F F F F	! !	11.6	5.8		5.4

Source: Based on data from official U.S.S.R. sources.

Lomputed above 40°F. base.
 Data for 1927-28 not available.
 n.a. - not available.

TABLE 28

PHENOLOGY AND DAY-DEGREE SUPPATIONS FOR WINTER WHEAT (Local Variety)

Verkhnyachka, Kiev Oblast, Ukrainian S.S.R. Lat. 48°49'N; Long. 30°03'E; Elev. 900 ft.

					SU	SUMMATION OF DAY-DEGREES (°F.)	AY-DEGREES	(°F.)	
Crop	Date	Date	Date	Date	Emergence	March 1	Headed	Emergence	March 1
Year *	Sown	Emerged	Headed	Ripe	to Headed	to Headed	to Ripe	to Ripe	to Ripe
1923-24	Sept. 10	а. В	June 4	July 8	!	802	985	;	1,787
1924-25	Sept. 24	n.a.	May 30	July 21	!	820	1,140	!	1,960
1926-27	Sept. 3	n.a.	June 6	July 14	!	780	1,039	!	1,819
1927-28	Sept. 9	n.a.	June 18	July 23	:	986	868	!	1,884
1928-29	Aug. 29	n.a.	June 10	July 24.	-	840	1,085	1	1,925
1929-30	Sept. 11	n.a.	June 9	July 18	!	921	876	!	1,869
Mean Standard Coefficie	Mean Sept. 10 Standard Deviation	on (%)	June 8	July 18		858 80 9.3	1,016 90 8.9		1,874 61 3.3

Source: Based on data from official U.S.S.R. sources.

1/ Computed above 40°F. base.
* Data for 1925-26 not available.
n.a. - not available;

TABLE 29

AVERAGE PHENOLOGY AND DAY-DEGREE 1/SUMMATIONS FOR WINTER WHEAT

Prokhladnaya, Kabardino-Balkarskoy ASSR, North Caucasus, USSR Lat. 43°45'N; Long. 44°05'E; Elev. 660 ft.

-	-										
CASS NOD	RASMODARKA VAKLETI	I				CITAL	SATTON OF 1	CITAMATTON OF DAY-DEGREES ("F.	S (°F.)		
						DOLL	17700				1600
		4		Series to Mar	Mar	Readed to Headed Sown to Sown	Headed	Sown to	Sown	Mar. I to Mar.	Mar. 1
Pare	Date	Dere	Date	SOME CO	1 1 1			Line Ding	to Dine	Wax Ripe to Ripe	to Ripe
	Beeded	Car Pine	Rine	Headed to He	to Headed	leaded wax kipe to kipe wax hipe to hipe	co kipe	WAX ALDE	777		
1000	מבה הבה	744 64								,	
			•	,	700	808	1,086	2.044	2,321	1,646	1,923
Sept. 27	7 Nay 28	Jun. 26	Jul. 5	1,235	100			•	•		
	•										

Bajsan, Kabardino-Balkarskoy ASSR, North Caucasus, USSR Lat. 43°40'N; Long. 43°35'E; Elev. 1,498 ft.

HOWIUKBAINKA 83 VARIETY	A 83 VAR	IETY									
7 26	80	26	Jul. 5	1,117	723	751	1,014	1,868	2,131	1,474	1,737
or (m. 17dae	22 6										

Nalchik, Kabardino-Balkarskoy ASSR, North Caucasus, USSR
Lat. 43°25'N; Long. 43°35'E; Elev. 1,670 ft.

	!	
	1,493	
	!!	
	2,083	
	:	
	815	
	829	
	1,268	
	n.a.	
ETX	Jun. 30	
HOVOURALINA 83 VARIETY	May 27	ì
HOWOURA	Cant 17 May 27	Sept. 11

Based on data of Agroklimaticheskii Spravochnik po Kabardino-Balkarskoi ASSR. Leningrad, 1960. Source:

1/ Computed above 40°F. base. n.a. Not available.

AVERAGE PHENOLOGY AND DAY-DEGREE $\frac{1}{2}$ SUPPATIONS FOR WINTER WHEAT (Local Variety)

Morshansk, Central Chernozem Region, USSR Lat. 53°27'N; Long. 41°48'E; Elev. 472 ft.

SUMMATION OF DAY-DEGREES (°F.)	Emergence March 1 Headed Sown to Emergence $\frac{2}{1}$ March $\frac{12}{1}$ to Headed to Ripe Ripe to Ripe to Ripe	617 240 1,486 2,308 2,103 1,726
16	Date [£] / Sown to Ripe Headed	6 Jul. 21 822
	b Date	2 May 16
	Date Emerged	4 Sept. 2
	Sown	Aug. 24

Based on data of Agroklimaticheskiy Spravochnir Po Tambovskoy Oblasti. Leningrad 1959. Source:

1/ Computed above 40°F. base.
2/ Date given is for wax ripe.

TABLE 31

PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR TWO VARIETIES OF SPRING WHEAT

Kolomiya, Stanislavskiy Oblast, Ukraine SSR Lat. 48°32'N; Long 25°03'E.

	Crop Date Date Date Year Sown Emerged Head 1948 Apr. 15 Apr. 30 Jun. 1950 Apr. 4 Apr. 16 Jun. Hean Apr. 10 Apr. 23 Jun.	-DEGREES (°F.)	Date Sown to Emergenc	1	}	July Jr	
Date Date Headed Wax Ripe Jun. 20 Aug. 4 Jun. 16 Jul. 26 Jun. 18 Jul. 31	Date Date Date Emerged Headed Wax Ripe 15 Apr. 30 Jun. 20 Aug. 4 4 Apr. 16 Jun. 16 Jul. 26 10 Apr. 23 Jun. 18 Jul. 31	SUMMS	Emergenc to Heade				
	Date Emerified 15 Apr. 30 4 Apr. 16 10 Apr. 23				7.1 21	July Jr	
	34 0		·				

THEFT	THEFT STRANGED SE VARIETY	ARIETY							
1951 1952 1953 1954	MBr. 24 Apr. 20 MBr. 26 Apr. 14 Apr. 23	Apr. 16 Hay 6 Apr. 12 Hay 4	Jun. 20 Jun. 24 Jun. 14 Jun. 20 Jun. 26	Jul. 24 Aug. 6 Jul. 22 Jul. 30 Aug. 4	1,125 1,099 993 1,047 1,125	1,035 948 927 894 1,026	817 1,049 899 967 957	1,942 2,148 1,892 2,014 2,082	1,852 1,997 1,826 1,861 1,983
Mean	Apr. 9 rd Devistio	Mean Apr. 9 Apr. 26 Standard Deviation	Jun. 21	Jul. 30	1,078 58 5.4	966 65 6.7	938 80 8.5	2,016 100 5.0	1,904 86 86 4.5
11100		!							

Source: Based on data of Agroklimatichnii dovidnyk p Stanislavskii Oblastii. Kiev, 1959.

AVERAGE PHENOLOGY AND DAY-DEGREE $\frac{1}{2}$ SUMMATIONS FOR SPRING WHEAT (Local Variety)

Bila Krinitsya, Ternopil Oblast, Ukraine SSR, USSR Lat. 50°08'N; Long. 25°44'E; Elev. 756 ft.

					SUMMATIC	SUMMATION OF DAY-DEGREES (°F.)	ES (°F.)	
Date Sown	Date Emerged	Date Headed	Date Wax Ripe	Sown to Headed	Emergence to Headed	Headed to Wax Ripe	Sown to Wax Ripe	Emergence to Wax Ripe
Apr. 7	Apr. 24	Jun. 16	Jul. 23	976	861	880	1,826	1,741

Based on data of Agroklimatychnyi Dovidnyk po Ternopil's'kii Oblasti, Ukraine SSR. Kiev, 1959. Source:

1/ Computed above 40°F. base.

TABLE 33

:HEMOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Lutyestsyens Variety)

Bashtanka, Nikolayev Oblast, Ukraine SSR, USSR Lat. 47°25'N; Long. 32°28'E; Elev. 277 ft.

Crop DateDateSown toEmergenceHeaded toSown toYearSownEmergedHeadedWax RipeHeadedWax RipeWax Ripe1945Apr. 8Apr. 30Jun. 6Jul. 169988001,2102,208							SU	SUMMATION OF DAY-DEGREES ("F.	-DEGREES (°F.	
Sown Emerged Headed Wax Ripe Headed to Headed Wax Ripe Apr. 8 Apr. 30 Jun. 6 Jul. 16 998 800 1,210	Crop	Date	Date	Date	Date	Sown to	Emergence	Headed to	Sown to	Emergence
Apr. 8 Apr. 30 Jun. 6 Jul. 16 998 800 1,210	Year	Soen	Emerged	Headed	Wax Ripe	Headed	to Headed	Wax Ripe	Wax Ripe	to Wax Ripe
	1945	Apr. 8		Jun. 6	Jul. 16	866	800	1,210	2,208	2,010

Source: Based on data of Agroklimaticheskii Spravochnik Po Nikolayevskoi Oblasti, Ukraine SSR. Leningrad, 1959.

TABLE 34

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT GROWN IN TWO LOCALITIES OF NIKOLAYEV OBLAST, UKRAINE SSR, USSR

Bashtanka Lat. 47°25'N; Long. 32°28'E; Elev. 277 ft

HELYANCIPU	PLYANCIPUS 37 VARIETY				SUMMA	SUMMATION OF DAY-DEGREES (°F.)	GREES (°F.)	
Date	Date	Date	Date Wax Ripe	Sown to Headed	Emergence to Headed	Headed to Wax Ripe	Sown to Wax Ripe	Emergence to Wax Ripe
Sown	Nac I Kan			000	576	774	1,863	1,719
Mar. 25	Apr. 17	Jun. 7	Jul. 4	1,009	740			

	2,025	
	2,169	
	896	
	1,057	
	1,201	
	Jul. 13	
	=	
MELYANCPUS 69 VARIETY	4	Apr. 16
MELYANCPU		Mar. 31

Vosnyesyensk Lat. 47°34'N; Long. 31°20'E; Elev. 109 ft.

	700	
•	176	Jul. 8 324

Leningrad, 1959. Source: Based on data of Agroklimaticheskii Spravochnik Po Nikolayevskoi Oblasti, Ukraine SSR.

TABLE 35

PHENOLOGY AND DAY-DEGREE $^{1/}$ SUMMATIONS FOR TWO VARIETIES OF SPRING WHEAT

Dolina, Stanislavskiy Oblast, Ukraine SSR Lat. 48°58'N: Long. 23°59'E.

LICAL VARIETY

•									
Crop	Dete	Pere	1	Š		SU	SUMMATION OF DAY-DEGREES (°F)	-DEGREES (°F	
Year	Som	Emerged	Readed	Date Ripe	Sown to Headed	Emergence to Headed	Headed to	Sown to	Emergence
1951	Apr. 11	May 5	Jun. 30	Aug. 15	1,145	985	1,027	2,172	2,012
LUTTES	LUTYESTSYERS 62 VARIETY	ARIETY							
1952 1953 1954	Apr. 19 Apr. 9 Apr. 30	Apr. 30 Apr. 30 May 10	Jun. 30 Jun. 25 Jun. 30	Aug. 10 Aug. 5 Aug. 5	1,105 1,055 1,050	1,050 950 910	922 917 817	2,027 1,972 1,867	1,972 1,867 1,727
Yeen	Apr. 19	16 y 3	Jun. 28	Aug. 7	1,070	970	885	1,955	1,855

Source: Besed on data of Agroklimatichnii dovidnyk p Stanislavskii Oblasti. Kiev, 1959.

^{1/} Computed above 40°F. base

TABLE 36

Property of

Company in the second

1.64

AVERAGE PHENOLOGY AND DAY-DEGREE $^{1/}$ SUMMATIONS FOR SPRING WHEAT (Lutyestsyens 62 Variety)

Gryazi, Lipetsk Oblast, Central Chernozem Region, RSFSR, USSR *Lat. 53°30'N; Long. 40°E.

				i	SUMMATIO	SUMMATION OF DAY-DEGREES (F.)	SKEES F.	
Date Sown	Date Emerged	Date Headed	Date Ripe	Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
29	76 9	Jun. 21	Aug. 1	1,009	871	1,108	2,117	1,979

Based on data of Agroklimaticheskii Spravochnik Po Lipetskoi Oblasti. Leningrad, 1960. Source:

AVERAGE PHENOLOGY AND DAY-DEGREE $^{1/}$ SUPPATIONS FOR LOCAL VARIETIES OF SPRING WHEAT GROWN IN A NUMBER OF LOCALITIES IN EAST KAZAKHSTAN OBLAST, CENTRAL ASIA, SSR

*Lat. 50°30'N; Elev. 1,056 ft. Shemona 1kha

							S	UMMATION C	SUMMATION OF DAY-DEGREES (°F.)	EES (°F.)		
Dete Soen	Dete Emerged	Date Headed	Date Wax Ripe	Date Ripe	Sown to Headed	Emergence to Headed	Headed to Wax Ripe	Headed to Ripe	Sown to Wax Ripe	Sown to Ripe	Emergence to Wax Ripe	Emergence to Ripe
Apr. 26	May 111	May 11 Jun. 28	Jul. 30	Aug. 7	1,055	915	852	1,050	1,907	2,105	1,767	1,965
				7	Leninc *Lat. 50°N; Long.	Leninogrosk Long. 85°E; Elev. 2,567 ft.	Elev. 2,5	67 ft.				
May 5	May 21	May 21 Jul. 12	Aug. 18	n.a.	1,134	974	837	1 1	1,971	-	1,811	1 1 1
				*Lat. 45	9°44'N; L	Zyryanovsk *Lat. 49°44'N; Long. 84°18'E; Elev. 1,313 ft.	;; Elev. 1,	313 ft.				
Nay 6	May 16	18y 16 Jul. 3	Aug. 7	Aug. 17	1,112	982	915	1,135	2,027	2,247	1,897	2,117
				*Iat	Bolshoye	A .	Narimskoye 85°E; Elev. 3,630 ft.	630 ft.				

Based on data of Agroklimaticheskiy Spravochnik Po Vostochno-Kazákhstanskoy Oblasti. Leningrad, 1960.

2,206

1,966

2,296

2,056

1,181

941

1,025

1,115

Aug. 8

Jul. 30

Jun. 27

TEX 7

Apr. 22

Computed above 40°F. base. Not available.

Source:

Approximate coordinates.

TABLE 38

AVERAGE PHENOLOGY AND DAY-DEGREE¹/SUMMATIONS FOR LOCAL VARIETIES OF SPRING WHEAT GROWN IN A NUMBER OF LOCALITIES IN EAST KAZAKHSTAN OBLAST, CENTRAL ASIA, SSR

Katon-Karagey *Lat. 48°40'N; Long. 87°E; Elev. 1,320 ft.

	Emergence to Ripe	1,923		2,248		•		1 1 1	
(:	Emergence to Wax Ripe	1,703		1,977	,	2,082		2,284	
GREES (°F	Sown to Ripe	2,033		2,390		‡ ‡ 1] 	
SUMMATION OF DAY-DEGREES (°F.	Sown to Wax Ripe	1,813		2,119		2,370		2,456	
SUMMATION	Headed to Ripe	1,038	į.	1,207	,653 ft.	 		ļ	
	Headed to Headed Wax Ripe to Rip	818	7. 3,567 £	936	E;Elev. 4	066	ft.	1,188	
	Emergence to Headed	885	Samarka 48°45'N; Elev. 3,567 ft.	1,041	Koomeshkino *Lat. 48°10'N; Long. 85°E;Elev. 4,653 ft.	1,092	Booran *Elev. 1,386 ft.	1,096	
	Sown to Headed	995	*Lat. 4	1,183	t. 48°10'	1,380	*	1,268	
	Date Ripe	Aug. 23		Aug. 5	*I.a	n.a.		n.a.	
	Date Wax Ripe	Aug. 12		Jul. 27		Aug. 2		Aug. 3	
	Date Headed	Jul. 16		J ¹ m. 26		Jul. 1		Jun. 26	
	Date Emerged	May 12		Mary 9		May 18		May 10	
•	Date Sown	Apr. 27		Apr. 25 May 9		May 2		Apr. 26	

Source: Based on data of Agroklimaticheskiy Spravochnik Po Vostochno-Kazakhstanskoy Oblasti. Leningrad, 1960.

^{1/} Computed above 40°F. base.
n.a. Not available

* Approximate coordinates.

Approximate coordinates.

TABLE 39

AVERAGE PHENOLOGY, AND DAY-DEGREE¹/ SUMMATIONS FOR SPRING WHEAT (Local Variety) GROWN IN EAST KAZAKHSTAN OBLAST, CENTRAL ASIA, SSR

Zaysan 2 ALat, 47 3 N; Long. 85 $^{\circ}$ E; Elev. 1,815 ft.

	Emergence to Ripe	2,409
	Sown to Emergence Headed to Headed Sown to Sown to Emergence Emergence Headed to Headed Wax Ripe to Ripe Wax Ripe to Wax Ripe to Ripe	2,118
1.7	Sown to Ripe	2,566
UAY-DEGREES	Sown to Wax Ripe	2,275
ATTON OF	Headed to Ripe	1,286
SUMM	Headed to Wax Ripe	566
	Emergence to Headed	1,123
	Sown to Headed	1,280
	Date Ripe	25 Aug. 3
	Date Wax Ripe	Jul.
	Date Headed	Jun. 24
	Date Emerged	May 8
	Date Sown	Apr. 25 May 8

Source: Based on data of Agroklimaticheskiy Spravcchnik Po Vostochno-Kazakhstanskoy Oblasti. Leningrad, 1960.

Lomputed above 40°F. base.
 Approximate coordinates.

TABLE 40

AVERAGE PHENOLOGY AND DAY-DEGREE $^{1/2}$ SUMMATIONS FOR LOCAL VARIETIES OF SPRING WHEAT GROWN IN A NUMBER OF LOCALITIES IN PRIMORSKIY (MARITIME) KRAY, USSR

								SUMMATION	SUMMATION OF DAY-DEGREES	RES (°F.)	
			Date	Date	Date	Date	Sown to	Emergence	Headed	Sown	Emergence
Locality	*Lat.	*Long.	Sown	Emerged	Headed	Ripe	Headed	to Headed	to Ripe	to Ripe	to Ripe
	(N)	(E)	-								
Kartun	44°10'	133°	Apr. 30	May 17	Jul. 2	Aug. 12	1,000	824	1,138	2,138	1,962
Malinovka	43°	131°30'	Apr. 26	May 12	Jun. 29	Aug. 4	096	828	1,025	1,985	1,853
Turiy Rog	°44°	133°	Apr. 9	May 7	Jul. 1	Aug. 6	1,001	935	1,044	2,045	1,979
Juravlevka	45°	134°	Apr. 30	May 12	Jun. 29	Aug. 7	868	788	1,078	1,976	1,866
Aetrakhanka	43°	134°	<u>Å</u> pr. 20	May 8	Jul. 3	n.a.	1,060	926	:	!	;
Anuchino	43°	133°	Apr. 19	May 8	Jun. 29	Aug. 7	1,091	928	1,117	2,136	2,045
Primorskaya	,94	137°30'	Apr. 16	May 6	Jul. 2	Aug. 10	896	913	1,071	2,039	1,984
Margaritovo	44°30'	132°	Apr. 22	May 8	Jul. 4	n.a.	902	657	1 0 1	!	! ! !
Maykhe	45°	133°	Apr. 8	May 1	Jul. 1	Aug. 11	819	819	1,086	1,905	1,905

Source: Based on data of Agroklimaticheskiy Spravochnik Po Primorskomu Kraiu. Leningrad, 1960.

Computed above 40°F. base. Not available. Approximate coordinates.

n.m.

TABLE 41

SUMMATIONS FOR SPRING WHEAT (Norin 75 Variety) PHELOLOGY AND DAY-DEGREE

HOKKAIDO NATIONAL AGRICULTURAL EXPERIMENT STATION Sapporo, Hokkaido, Japan Lat. 43°04'N; Long. 141°21'E; Elev.56 ft.

				SUMMAT	SUMMATION OF DAY-DEGREES	ES (°F.)
1	Date	Date	Date	Sown-to-	Headed	Sown-to-
Year	Sown	Headed	Ripe	Headed	to Ripe	Ripe
	Apr. 28		Aug. 3	895	1,138	2,033
1950 A	Apr. 28	June 20		864	1,133	1,997
	Apr. 28			1,007	1,110	2,117
	Apr. 28		July 30	076	1,002	1,942
1953 A	Apr. 28			918	1,012	1,930
1954 A	Apr. 28	July 5	Aug. 16	959	1,083	2,042
MeanApr. 28	Apr. 28	June 26	Aug. 4	930	1,080	2,010
Coefficient of Variation (%)	ation (%)		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5.2	5.6 5.6	3.3

Source: Based on data of Hokkaido National Agricultural Experiment Station, Sapporo, Hokkaido, Japan.

 $\underline{1}$ / Computed above 40°F. base.

TABLE 42

The second

A section with

Contraction of

SUMMATIONS FOR SPRING WHEAT (Norin 29 Variety) HOKKAIDO NATIONAL AGRICULTURAL EXPERIMENT STATION Sapporo, Hokkaido, Japan Lat.43°04'N; Long.141°21'E; Elev. 56 ft. PHENOLOGY AND DAY-DEGREE

				SUMMAT	SUMMATION OF DAY-DECREES	_
	Date	Date	Date	Sown-to-	Headed	Sown-to-
Year	Sown	Headed	Ripe	Headed	to Ripe	Ripe
1949			Aug. 5	952	1,149	2,101
1950			July 30	952	1,111	2,063
1951			Aug. 8	1,028	1,124	2,152
1952	Apr. 28		Aug. 1	984	786	1,971
1953		June 30	Aug. 6	958	1,028	1,986
1954	Apr. 28		Aug. 13	887	1,068	1,955
Mean Apr. 28	- Apr. 28	June 28	Aug. 6	096	1,078	2,038
Standard Deviation		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	t t t t t t t t t t t t t t t t t t t	38	63	3
Coefficient of Variation (%)	iation (%)		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4.0	5.8	4.1

Source: Based on data of Hokkaido National Agricultural Experiment Station, Sapporo, Hokkaido, Japan.

TABLE 43

${ m BARGE}^{1/}$ OF DAY-DEGREE^{2/} STROKTIONS OF HOME WHEAT WALLSTIES GROWN IN SOME ARRAS OF THE MORTHER GREAT FLATHS REGION BY THE UNITED STATES AND IN A RUBBER OF THEIR LATITUDINAL AND CLIMATIC CCURTREPART AREAS IN OTHER COUNTRIES

					HINEATTON OF I		<u> </u>		March 1	Source of
location	Latitude	Sown to Easded	Energence to Eccled	March 1 to Heeded	Ecoded to Rips	Sown to Wex Ripe	Sora to Eine	Energence to Rise	March 1 to Ripa	Table Hos.
MITED STATES										
Montana					*					
Bayre	48°34'#		979-1,109	943	964-1,015			1,943-2,124	1,958	5, 13
Moccasin	47°00'N	1,020	909	854	820-898		1,919	1,807	1,674	6, 15
North Dakote		-								
Langdon	48°45'N	1,181			950		2,131			12
Williston	48°09'#	1,139			960		2,099			14 16
Pargo	46°54'H	1,174	1,046		920		2,094	1,966		17
Dickinson	46°53'W	984	905		945 929		1,929 1,996	1,850 1,949		18
Handan Vacada	46°50'N	1,067	1,020		929		1,770	1,747	300	
Wyoming Sheridan	44°51'N	1,030	957-1,118	959	935-987		2.017	1.944-2.053	1,934	7. 19
South Dekote	JI N	1,000	,,,-1,110	,,,	333-707		-,	2,744 2,035	.,,,,,	
Newell	44"44'H	1,237	1,090		1.041		2.278	2,131		20
Brookings	44°18'N	1,253	1,166		971		2,224	2,137		21
Hebraska			-,				•	•		
Alliance	42°10'W	1,059		841	973-1,020		2,042			8, 22
North Platte	41°05'H	1,255		1,021	903-1,018		2,158		2,039	9, 23
Lincoln	40°51'N		1,593	1,091	1,038			2,631	2,129	10
SSR										
Ukraine SSR	400001m	000 1 157	800 1 181			1,826				26, 32
Bila Krinitaya	50°06'N 49°40'N	998-1,357	800-1,181	865	1,030	1,820				20, 32 27
Mironovka	49°34'H	1,362	1,212	003	1,030	2.293			1,895	26
Ternopil Dolina		1,302	970-985			1,955-2,172				35
Borahchiv	40 36 N 48 48 N	1,336	1,176			2,127				26
Kolomiya		1,030-1,078	949-966		***	2,016-2,052	***	***		31
Verkhnyschka	48°29'W	-1000-11010		858	1,016	-,010 -,000			1,874	28
Voznyesyensk	47°34'N	924-1.462	784-1.143	705		1.759-2.298				25, 34
Bashtanka	47°25'H	998-1,201	800-1,057			1,863-2,208				33, 34
Morth Caucasus		Ť	• •			•				
Prokh ladnaya	43°45'N	1,235		837	1,086	2,044	2,321			29
Bajwan	43°40'N	1,117		723	1,014	1,868	2, 131			29
Malchik	43°25'#	1,268		678		2,083		•••		29
Central Chernozem. RSFSR										
Gryezi	53°30'#*	1,009	871		1,106		2,117	1,979		36
Morshansk	53*27'ສ	822	617	240	1,486		2,308	2,103	1,726	30
Central Asia SSR	F09001994		915		1 060	1 007	2 105	1 044		37
Shemonaik a	50°30'8* 50°00'8*	1,055 1,134	915 974		1,050	1,907 1,971	2,105	1,965	***	37
Leninogrosk Zyrvanovsk	49*44'N*	1,134	974 982		1,135	2,027	2,247	2.117		37
Bolshoye Marimskoye	48°45'N*	1,112	1.025		1,181	2,056	2,296	2,206		37
Katon-Karagay	48°40'#*	995	885		1,038	1,813	2,033	1,923		38
Samarka	48°45'#*	1,183	1,041		1,207	2,119	2,390	2,248		38
Koomashkino	48°10'#*	1.380	1.092			2,370				38
Booran	48°00'N*	1,268	1,096			2,456	•••	•••		38
Zaysan	47°00'N*	1.280	1,123			2,275	2,566	2,409		39
Primorskiy (Maritims) Kre		-,	-,							
Primorskaya	46°00'N*	968	913		1,071		2,039	1,984		40
Juraylevka	45°00'#*	898	788		1,078		1,976	1,866		40
Maykhe	45°00'N*	819	819		1,086		1,905	1,905		40
Margaritovo	44°30'**	706	657							40
Kartun	44°10'W*	1,000	824		1,138		2,138	1,962	•••	40
Turiy Rog	44°00'#*	1,001	935		1,044		2,045	1,979		40
Malinovka	43°00'N*	960	828	•••	1,025		1,985	1,853		40
Anuchino	43°00'N*	1,091	928		1,117		2,136	2,045		40
Astrakhanka	43°00'11*	1,060	976							40
APAN										
Hokkaido										
Sapporo	43°04'11	930-960			1.078-1.080		2,010-2,038			41,42

^{1/} Range of means of day-degrees have been used wherever possible.
2/ Computed above 40°F. base.
* Approximate coordinates.

TABLE 44

ſ.

and the second feet

The second of

To the same of the

A COMPANY OF THE

1000

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1930-1948 *

Havre, Montana

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1930-31	28	70	31	53	29	36	32	46	26	29	69	ł
1931-32	59	48	56	23	18	21	22	48	57	65	70	:
1932-33	57	43	32	20	22	16	35	42	24	69	73	!
1933-34	57	74	36	16	28	31	33	50	62	62	72	6 8
1934-35	51	67	38	23	80	28	26	38	52	62	73	99
1935-36	!	;	;	;	1	1	1.	41	63	29	80	70
1936-37	l I	;	;	!	ŧ	!	!	47	58	65	73	89
1937-38	58	63	30	20	24	80	32	45	53	7 9	71	29
1938-39	!	I.	!	1	!	;	;	47	59	58	73	69
1939-40	1	!	!	!	ł l	1	;	41	59	65	72	70
1940-41	3	52	21	27	20	23	33	94	58	65	73	69
1941-42	;	;	1	!	!	l I	1	48	52	59	70	29
1942-43	58	48	29	20	\$	26	23	50	52	59	70	69
1943-44	57	50	36	28	28	23	23	48	59	09	69	99
1944-45	6c	52	25	20	18	19	35	40	52	59	73	!
1945-46	24	64	27	16	26	24	41	51	52	62	73	;
1947-48	27	51	27	26	27	16	25	74	57	63	69	:

Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period. *

TABLE 45

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1929-1949 *

Moccasin, Montana

	•	•))	D ec.	Jan.	run.	ra i	Apr.	ried y	omic	Juty	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1929-30	87	47	30	54	80	34	29	48	67	59	69	29
1930-31	1	;	;	;	;	1	;	42	52	62	29	99
1931-32	56	97	28	30	19	27	22	43	53	58	99	65
1932-33	!	!	ł	;	:	:	;	36	48	63	69	79
1933-34	\$	47	37	24	31	31	32	46	59	58	89	65
1934-35	65	48	38	27	21	33	24	33	47	56	89	%
1935-36	57	45	30	31	18	-03	28	40	58	79	9/	99
1936-37	55	47	35	24	02	17	29	42	54	59	69	65
1937-38	57	48	31	23	26	20	32	43	48	59	65	64
1938-39	63	94	30	28	28	14	32	43	54	53	89	99
1939-40	56	43	43	34	15	22	34	39	24	61	69	89
1940-41	61	51	25	31	29	27	33	41	53	59	89	65
1941-42	65	77	37	26	27	19	29	44	84	54	65	63
1943-44	56	87	37	31	31	21	23	77	54	55	62	61
1944-45	55	51	31	26	27	21	33	36	47	53	29	99
1946-47	55	40	27	28	26	20	27	42	51	54	89	9
1947-48	\$	67	28	30	25	18	25	40	20	57	62	65
67-876	57	47	31	16	10	16	29	87	54	58	65	67

^{*} Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 46
MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1926-1951 *

Sheridan, Wyoming

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1926-27	51	87	31	21	17	54	33	41	20	61	. 19	49
1927-28	99	67	32	10	23	22	36	42	58	56	89	65
1928-29	2 6	45	30	21	07	12	33	41	51	61	72	73
1929-30	ጵ	47	26	19	z	31	31	52	53	62	74	73
1930-31	59	42	35	29	28	31	31	45	54	69	74	72
1931-32	62	47	32	22	14	19	24	47	56	63	71	;
1932-33	58	40	35	16	21	14	34	40	52	69	74	89
1933-34	1	!	!	1	1	!	ı	47	62	65	75	70
1934-35	53	51	40	27	20	31	31	39	48	61	75	69
. 1935-36	59	97	27	27	19	02	31	41	61	69	80	73
1936-37	61	47	34	25	01	16	28	77	58	9	71	72
1937-38	1	:	t I	;	1	!	! !	45	52	63	69	69
1938-39	1	1	!	!	1	!	;	97	57	9	73	89
1939-40	59	87	38	33	13	23	38	42	56	99	75	73
1940-41	1	1	:	:	ŧ	;	1	43	57	65	72	71
1941-42	አ	77	36	23	22	21	33	47	20	59	70	69
1942-43	57	47	30	27	16	30	22	50	67	9	69	71
1943-44	57	67	36	27	22	19	26	45	56	58	29	29
1944-45	57	20	32	21	22	22	33	38	52	57	69	69
1945-46	55	87	31	22	26	26	38	51	50	62	71	99
1947-48	59	51	26	25	24	18	26	97	57	63	89	69
1950-51	;	;	1	1	;	;	;	41	99	55	70	69

^{*} Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 47

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1930-1950 *

Alliance, Nebraska

Aug.	(°F.)	;	1 1	!	72	70	73	9/	74	70	70	72	:	73	70	69	75	72	!	:
July	(°F.)	75	74	74	77	73	78	74	72	9/	77	72	72	74	71	74	73	72	74	69
June	(°F.)	72	29	7.1	29	62	89	62	99	7 9	89	63	62	63	57	79	61	7 9	7 9	65
May	(°F.)	55	58	51	7 9	97	59	57	55	9	58	59	67	50	52	50	53	56	26	20
Apr.	(°F.)	47	67	42	47	38	42	77	7 7	45	42	45	48	67	40	52	77	50	48	41
Mar.	(°F.)	34	28	36	37	36	35	31	39	37	35	31	34	25	37	41	32	29	34	30
Feb.	(°F.)	35	33	20	ļ	!	i	!	30	19	29	29	24	33	28	34	24	1	21	31
Jan.	(°F.)	32	22	27	!	;	1	!	27	29	13	28	21	24	26	30	27	;	90	19
Dec.	(°F.)	31	27	19	i	:	1	!	24	28	34	27	29	29	23	22	30	1	24	26
Nov.	(°F.)	36	34	39	;	ł	•	1	30	32	38	31	38	34	35	36	34	1	33	43
Oct.	(°F.)	97	51	77	i	:	!	i	67	53	20	አ	47	67	20	51	45	i	87	95
Sept.	(°F.)	09	99	62	;	!	;	1	Z	\$	\$	99	59	57	09	57	61	;	65	59
Crop Year		1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50

^{*} Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 48

Contraction (c.)

Single-rains of

a large to the

To all plans

MEAN MONTHLY TEMPERATURE DATA FOR THE YEARS 1930-1952 *

North Platte, Nebraska

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1930-31	99	51	37	29	33	39	35	2 0	58	92	78
1	7.1	55	37	29	23	33	31	53	63	70	78
1933-34	69	ĸ	42	33	34	33	39	52	69	75	83
1934-35	9	57	42	28	29	35	43	46	52	29	81
1935-36	3	20	35	30	22	11	40	47	3	73	83
1936-37	:	!	;	;	i i	;	35	87	63	89	79
1937-38	1	ì	;	;	;	!	43	20	59	71	77
1938-39	89	59	35	30	33	23	07	64	65	70	80
1939-40	69	53	41	35	13	31	39	48	09	72	80
1940-41	•	1	;	i i	!	:	36	51	65	69	75
1941-42	65	52	41	31	26	25	38	53	57	89	77
1943-44	63	52	39	31	29	27	31	77	63	69	74
57-7761	ž	ĸ	38	28	30	32	77	95	56	62	75
1945-46	62	55	40	22	32	37	45	57	55	70	77
15-9561	Z	20	36	33	30	27	35	47	75	6.5	74
1947-48	99	09	34	29	27	28	32	56	61	89	75
67-8761	89	52	36	27	12	25	36	(O)	61	89	74
1949-50	62	52	47	30	19	31	33	43	56	89	70
1950-51	62	26	34	30	24	32	32	45	59	61	70
1951-52	59	87	35	2.1	28	32	31	,	80	75	75

same period of years. Temperature data for spring wheat are given or y for the April - August period. Temperature data utilized in conjunction with spring and winter wheat phenology records covering the

TABLE 49

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Langdon, North Dakota

Crop Year	April	May	June	July	Aug.	Sept.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1934	39	58	62	70	65	20
1938	39	51	61	29	89	61
1939	39	58	09	72	69	57
1940	34	53	09	89	65	61
1941	42	57	63	69	65	24
1942	41	87	59	79	79	52
1943	43	67	59	69	65	54
1944	40	57	61	99	63	55
1945	35	45	58	99	65	52
9761	97	51	62	89	3	5.5
1948	35	55	63	89	29	62
1949	43	ጵ	62	29	69	75
1950	78	47	09	79	61	57
1951	37	56	58	99	61	50
1952	87	53	63	65	65	26

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 50

7.450%

and south states

- water

PEAN PONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Williston, North Dakota

				1	4
Crop Year	April	May	June	July	August
	(°F.)	("1.)	(°F.)	(°F.)	(,k.)
7761	77	59	61	69	99
1965	38	67	58	70	89
10%	9	51	63	72	99
1967	7 7	15	09	73	70
1000	77	26	63	69	70
1950	35	51	61	29	3
20.71	36	26	59	71	65
1952	51	56	79	29	89
-					

Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

`

TABLE 51

HEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Fargo, North Dakota

Crop Year	April	May	June	July	August
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1934	42	75	99	72	68
1935	39	52	62	92	69
1936	36	29	99	80	22
1937	41	58	79	72	74
1938	77	52	65	7.1	72
1939	07	62	65	73	71
1940	07	55	63	72	19
1941	46	58	99	72	69
1943	77	51	79	73	70
1944	41	58	65	69	<i>2</i> 9
1945	39	87	59	89	89
1946	17	52	65	71	99
1661	70	59	61	89	65

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Dickinson, North Dakota

Crop Year	April	May	June	July	August
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1930	47	67	61	. 72	70
1931	43	53	89	69	99
1932	45	55	65	. 02	29
1933	07	52	69	72	29
1934	77	63	62	72	99
1935	38	47	59	73	65
1937	41	.99	63	71	72
1939	43	28	57	72	99
1940	37	53	62	71	29
1942	43	87	58	99	99
1943	97	67	59	69	29
1944	41	26	59	99	63
1945	37	47	56	29	99
1946	67	67	62	71	65
1547	07	20	58	70	69
1948	43	53	61	68	69
1950	32	. 84	09	99	7 5
1951	38	55	57	89	65
1952	87	56	79	29	89

Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 53

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Mandan, North Dakota

1931 (°F.) (°F.) (°F.) 1932 45 54 69 71 1932 46 56 67 71 1933 42 56 67 73 1934 45 56 66 66 74 1935 40 50 62 75 1938 46 53 66 71 1938 46 53 66 71 1938 46 53 66 71 1938 46 53 66 71 1938 66 71 72 1938 66 71 72 1938 66 71 72 1938 66 71 72 1938 66 71 72 1939 73 74 72 1930 73 74 74 1930 74 75 74 1930 74 75 74 1930 74 74 74<	Crop Year	April	May	June	July	August
45 54 69 46 56 67 42 56 67 42 56 66 40 50 66 42 58 64 46 53 66 64 53 66 65 66		(°P.)	(°F.)	(°F.)	(°F.)	(°F.)
46 56 67 42 56 72 45 66 66 40 50 62 42 58 64 46 53 66 63 66 66	1931	45	*	69	71	67
42 56 72 45 66 66 40 50 62 42 58 64 46 53 66 64 53 66 65 64 65	1932	97	26	29	71	69
45 66 66 40 50 62 42 58 64 46 53 66	1933	42	26	72	73	20
40 50 62 42 58 64 46 53 66	1934	45	99	99	74	20
42 58 64 64 64 64 64 64 64 64 64 64 64 64 64	1935	07	20	62	75	89
46 53 66	1937	42	28	\$	7.5	74
73 67	1938	97	53	99	71	71
	1939	43	62	61	74	69

^{*} Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 54

MEAN MONTHLY TEMPERATURE DATA FOR SOUTH DAKOTA*

Newell, South Dakota

Crop Year	April	May	June	July	Aug.
	(*F.)	(°F.)	(°F.)	(°F.)	(°F.)
1935	07	67	62	77	. 70
1936	07	62	7.1	81	73
1937	42	58	\$	7.4	75
1938	77	z	99	73	73
1941	45	61	\$	73	71
1942	67	20	61	70	70
1944	43	58	61	69	69
1950	38	20	63	89	<i>L</i> 9

^{*} Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 55

HEAN HONTHLY TEMPERATURE DATA FOR SOUTH DAKOTA *

Brookings, South Dakota

Crop Year	April	May	June	July	August
	(*F.)	(°F.)	(°F.)	(°F.)	(°F.)
1934	47	70	72	76	70
1935	42	52	75	79	72
1936	41	63	89	82	75
1937	42	09	65	76	78
1938	25	55	89	75	9/
1939	45	65	69	77	72
1940	43	57	89	9/	70
1941	67	63	29	74	74
1942	51	*	65	71	20
1950	37	ጵ	29	29	99

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 56

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Ternopil Oblast, Ukraine SSR, USSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.) (°F.) (°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.) (°F.) (°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Ternopil	22	24	33	77	57	62	65	63	55	97	35	27
Borshchiv	22	54	33	46	57	62	65	\$	99	47	35	27
Bila Krinitsya	24	26	33	45	99	62	9	63	95	47	36	28

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 57
MEAN MONTHLY TEMPERATURE DATA - NORMALS*
Nikolayev Oblast, Ukraine SSR, USSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.) (°F.)		(°F.)	(°F.)	(°F.)	(°F.)						
Bashtanka	22	25	35	67	61	89	74	73	. 79	20	38	29
Voznyesyensk	23	25	34	47	59	65	70	69	59	48	36	27

^{*} Temperature data utilized in conjunction with wheat phenology records.

TABLE 58

HEAN HONTHLY TEMPERATURE DATA FOR YEARS 1922 - 1930*

Mironovka, Kiev Oblast, Ukrainian S.S.R.

(°F.) (°F.) (°F.) (°F.) (°F.) (°F.) 62 51 44 27 9 18 63 45 33 23 31 35 56 46 37 24 21 23 56 47 43 28 18 18 57 44 40 28 17 3) (°F.) 9 31	(°F.) 34 25 36	(°F.) 42 42 48	_	1	(°F.) · 67 69
62 51 44 27 9 18 63 45 33 23 31 35 56 46 37 24 21 23 56 47 43 28 18 18	31	34 25 36		65 63		. 67
62 51 44 27 9 18 63 45 33 23 31 35 56 46 37 24 21 23 56 47 43 28 18 18 57 46 20 28 17 3	31 9		77	65	. 71	69
63 45 33 23 31 35 56 46 37 24 21 23 56 47 43 28 18 18 57 46 40 28 17 3	31	36	87	,		69
56 46 37 24 21 23 56 47 43 28 18 18 57 44 40 28 17 3	1,0		?	62	09	
56 47 43 28 18 18 18 54 57 54 50 28 17 3	4	30	87	09	65	70
47 66 40 28 17 3	18	36	97	26	88	70
	28 17 3	22	37	63	61	29
1929-30 55 53 39 29 29 25 37	. 29	37	48	59	63	29

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 59

HEAN HONTHLY TEMPERATURE DATA FOR YEARS 1923 - 1930*

Verkhnyachka, Kiev Oblast, Ukrainian S.S.R.

Crop Year	Aug.	Sept.	0ct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	(°P.)	(°F.)	(°F.)	(.k.)	(°F.)							
1923-24	3	61	51	77	27	10	21	29	41	62	70	65
1924-25	65	63	97	33	22	30	35	36	87	09	58	89
1926-27	61	55	94	77	28	19	18	36	97	55	29	89
1927-28	69	63	84	35	14	22	16	25	45	56	09	69
1928-29	3	57	3	07	27	16	г	21	37	61	61	89
1929-30	72	Я	23	39	28	28	27	37	47	57	63	99

^{*} Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 60

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Stanislavskiy Oblast, Ukraine SSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug. Sept.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.) (°F.) (°F.)	(°F.)	(°F.)	(°F.)		(°F.)	(°F.)	(°F.) (°F.) (°F.) (°F.)	(°F.)	(°F.)	(°F.)
Kolomiya	22	26	34	97	57	62	65	3	56	97	35	27
Dolina	25	28	35	45	55	09	63	61	54	47	36	59

^{*} Temperature data utilized in conjunction with wheat phenology records.

TABLE 61 MEAN MONTHLY TEMPERATURE DATA - NORMALS*

USSR		
Caucasus,		
North		
ASSR, No		
Kabardino-Balkarskoy		

Locality	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.	(°F.)	(°F.)	(°F.)	(°F.)	(°F.) (°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Prokhladnaya	24	27	35	67	61	69	73	72	62	20	39	29
Bajsan	24	26	35	47	59	67	72	7.1	61	20	37	29
Nalchik	54	. 26	35	47	58	65	70	69	09	20	37	29

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 62 MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Lipetsk Oblast, Central Chernozem Region, RSFSR, USSR

Locality	Jan.	Jan. Feb. Mar.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.) (°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.) (°F.))	(°F.)	(°F.)) (°F.) (°	(.k.)
cryazi	13	13	23	41	57	3	89	65	አ	77	29	18

TABLE 63
MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Tambov Oblast, Central Chernozem Region, RSFSR, USSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Aug. Sept.	Oct.	Nov.	Dec .
	(°F.)	(°F.)	(°F.)	(°F.)	°F.) (°F.) (°F.)	(°F.)	(°F.)	(°F.)	(°F.) (°F.) (°F.) (°F.) (°F.)	(°F.)	(°F.)	(°F.)
Morshansk	12	12	22	39	56	63	79 29	35	53	40	28	16

^{*}Temperature data utilized in conjunction with wheat phenology records.

TABLE 64

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

East Kazakhstan Oblast, Central Asia, SSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F,)	(°F.)	(°F.)	(°F.)	(°F.)
Shemonaikha	0	.1	12	34	54	63	29	7 9	51	38	18	ς.
Leninogorsk	6	6	18	34	20	09	79	61	. 50	36	17	10
Zyrya novsk	σο 1	1 . 1	9/	33	53	79	29	62	51	37	13	- 5
Bolshoye Narimskoye	- 7	2	∞	36	55	65	69	99	54	38	1.5	- 2
Katon-Karagay	7	10	21	37	50	59	63	09	20	36	18	10
Samerka	0	Ŋ	19	77	57	99	71	69	28	57 66 71 69 58 43 19	19 6	9
Koomashkino	- 2	0	15	43	58	89	7.1	69	28	43	20	က
Booren	- 2	က	20	42	58	89	72	89	57	42	20	5
Zaysan	-	'n	20	3	59	69	73	70	59	43	20	9

^{*} Temperature data utilized in conjunction with wheat phenology records.

TABLE 64

MEAN MONTHLY TEMPERATURE DATA - NORMALS* East Kazakhstan Oblast, Central Asia, SSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Shemonaikha	0	.1	12	34	54	63	<i>L</i> 9	79	51	38	18	2
Leninogorsk	6	6	18	34	20	09	\$	61	. 50	36	17	10
Zyryanovsk	∞ 1	2 2	6	33	53	75	29	62	51	37	13	5
Bolshoye Narimskoye	- 7	ا 5	∞	36	55	65	69	99	54	38	.15	- 2
Katon-Karagay	7	10	21	37	20	59	63	09	20	36	18	10
Samarka	0	Ŋ	19	41	57	99	7.1	69	28	43	19	9
Koomashkino	- 2	0	15	43	28	89	71	69	28	43	20	ო
Booran	- 2	က	20	42	58	89	72	89	57	42	20	5
Zaysan		in	20	44	59	69	73	70	59	43	20	9

^{*} Temperature data utilized in conjunction with wheat phenology records.

TABLE 66

MEAN MONTHLY TEMPERATURE DATA FOR JAPAN *

Kotoni, Sapporo, Japan

Apr. May June (*F.) (*F.) (*F.) 56 59 44 54 62 42 54 61 43 53 62 42 52 60	:			1		
(°F.) (°F.) (°F.) 56 59 44 54 62 42 54 61 43 53 62 42 52 60	crop lear	Apr.	May	June	July	Aug.
56 59 44 54 62 42 54 61 43 53 62 42 52 60 42 52 60		(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
44 54 62 42 54 61 43 53 62 42 52 60 42 52 60 62 60	1949	;	56	59	69	. 4/
42 54 61 43 53 62 42 52 60 64 60 60	1950	77	54	62	73	75
43 53 62 42 52 60 43 52 60	1951	42	24	61	29	75
42 52 60	1952	6 7	53	62	69	70
17	1953	77	52	09	39	89
71 21	1954	777	51	57	7 9	69

^{*} Temperature data utilized in conjunction with wheat phenology records covering the same partod of years.